



Photograph

MR. BENJAMIN HARRISON

Mr. T. K. Larkin

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IGHTHAM:

THE STORY OF A KENTISH VILLAGE AND ITS SURROUNDINGS.

REFERENCE

BY

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(Late of H.M. Geological Survey).

19 MAR 1907

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Numerous Illustrations, Plans, and a Map of the District on the
scale of two miles to one inch.

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PREFACE.

THIS volume is an attempt to set forth the record of what is recognised to be one of the most interesting districts in Great Britain.

The village of Ightham and its surroundings, so intimately associated with the name of Mr. Benjamin Harrison, have special and almost unique claims on the student of archæology and of natural science, offering, as they here do, a chain of evidence by which the history of man can be traced from Palæolithic times, and, as many think, from an even earlier epoch, down to the present day. The fossil fauna of the Ightham fissures has afforded much information, and its continued study will probably even yet yield further facts regarding the natural history of certain of the smaller animals.

It is obvious that the technical view of the subject could not be treated more at length than has been the case in the space at the disposal of the authors, and in a book which is primarily intended to appeal to the general public.

As is frequently the case in the production of such a volume, delays and difficulties have occurred, its plan has been altered more than once, and many additions have been made as the work proceeded. To such must be attributed many imperfections and inequalities that will, no doubt, be noticeable.

The omission of an article dealing with the Botany of the district, owing to the failure of assistance in that direction, is to be regretted. More, of course, might have been done had I been a resident, but I only

Preface.

came to live within easy distance of Ightham some seven years ago. I trust that what is recorded here will induce others to take up the story, and stimulate the continuance of such intensive surveys of similar areas, not only in Kent but in other parts of our country.

There is no more interesting or healthful pursuit than the study of the district round one's place of abode, even though that be in a town, and if such study be only taken up in the autumn of life when, as I myself have felt, activity is lessening. There is work for both young and old, and the student's usual experience results in a conviction that the more knowledge is acquired the more there seems to be to learn.

It is my pleasing duty to thank most heartily, not only those gentlemen whose names appear upon the title-page as contributors, but also, among others, Messrs. A. C. Martin-Hinton, W. Johnson, F.G.S., H. Preston, F.G.S., H. B. Woodward, F.R.S., F.G.S., and A. J. Wintersgill for their valuable advice and assistance.

F. J. BENNETT.

WEST MALLING,

February, 1907.

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INTRODUCTION.

THE traces of the pre-historic period found in the Ightham district, the knowledge of which constitute in large measure the result of the life-long labours of Mr. Benjamin Harrison, are the basis of so much of our knowledge of this period in the locality, that frequent reference must necessarily be made to them and to him.

A comparison of Mr. Harrison's personality with that of Robert Dick, of Thurso, is natural, and, indeed, if it had not been for the example of the latter, and of that of Gilbert White of Selborne, we might have had no Benjamin Harrison as the naturalist of Ightham. He, like Robert Dick, had to rely very much on self-culture, and has had the ties and anxieties of a business that has taken up most of his time, allowing only occasional days and half-days to be given to his exploration of the district. The wonder is that he has done so much within these limits. But, though self-culture may have many disadvantages, it also has its advantages, and Mr. Harrison has made the most of them. He has ever been a great and careful reader; and, what is more perhaps, has been a most careful and keen observer, noting down all that was worth recording in his nature studies.

Such being the case, many may wonder why it has been left to others to write this volume when one so well qualified should have been able to do it. But though a very ready and most interesting letter-writer, and with a very large and distinguished circle of correspondents, Mr. Harrison has, though repeatedly asked to do so, always shrunk from appearing in print. It is only because it seemed imperative, that the present writers have ventured to do what might apparently have been better done by Mr. Harrison himself.

Mr. Harrison's great claim to distinction is that he has, in the opinion of many authorities, pushed back the antiquity of man to a period much more remote than had previously been proved: so remote, indeed, that others hesitate to accept his discoveries for that reason alone. Though a young man when, in 1859 the discoveries of M. Boucher de Perthes (as set forth in Sir Joseph Prestwich's first paper read before the Royal Society) startled the scientific world, Mr. Harrison was fully able to receive and act upon

Introduction.

them, and soon found in the valley gravel deposits of his own district similar traces of man's presence. He not only did so, but he ultimately detected them at much higher levels than had been before thought possible. Stimulated by this success he, after much inductive reasoning, concluded that the highest ground near him, *viz.*, the plateau of the chalk downs, should contain the very earliest traces of man—ruder and cruder, of course, since the much more finished tools of the lower levels could not have represented man's first attempts in the art of flint knapping.

This shrewd induction proved correct, for on these elevations at a few spots only, and always associated with a worn and deeply-stained gravel deposit, he found certain rudely chipped flints often much worn (and totally distinct from, and never found with, the accepted Palæolithic implements*) which he was, after a time, able to classify and arrange into a few simple and distinct forms. These he put on one side till, feeling he had a good case, he submitted them in 1888 to the scrutiny and opinion of the late Sir Joseph Prestwich, who, after much consideration and many visits paid to the places where they were found, fully admitted them as the undoubtedly work of man, and read a classic paper before the Geological Society, in which he gave his adherence to them. Soon after this Sir Joseph Prestwich died, and Mr. Harrison was left almost alone to carry on the fight. Since then he has had many adherents, both among the older and the young and rising school of geologists. Many who hitherto opposed now admit some of the forms as man's work but object to their classification as Eolithic, considering that there is no warrant for any period older than the Palæolithic.

It may be thought that we have dwelt too long on this controverted point, but it is impossible to refer to Mr. Harrison without going into all this. We trust that his example will be followed by others, as many a spot, quite as unknown as Ightham was, awaits the labours of patient and careful local observers to become in the future a place of pilgrimage for those interested in tracing out the hidden history of our country. They will find a peculiar charm in so doing, which will stimulate them to still further research, and it is in the hope of inspiring such that this book has been written.

* It is true that a few Palæolithic implements have been found on the surface with the Eoliths, but never in the pit with them.

IGHTHAM,

The Story of a Kentish Village and its Surroundings.

CHAPTER I.

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AREA AND PHYSICAL FEATURES.

AREA.

THE area to which the attention of the reader is especially directed is practically that which Mr. Harrison has so happily termed "his world." It comprises about 16 square miles. The *Western* boundary extends from Woodlands on the north to Kemsing and Under River on the south. The *Northern* boundary from Woodlands to Terry's Lodge and to a little east of it. The *Eastern* line joins this last and extends southwards to Wrotham and to the west of West Peckham, and the *Southern* boundary runs thence to Under River.

This area forms a parallelogram with Ightham in the centre.

PHYSICAL FEATURES.

The physical features consist of two plateaus with their respective escarpments and separated by two vales.

The northern plateau is that of the Chalk with its well-marked escarpment, the highest points of which are 770 o.d. at Terry's Lodge and 740 o.d. at Crowslands. From this the ground falls slightly to the north with the dip slope to 520 o.d. at South Ash and 452 o.d. at Stansted. This plateau is furrowed by numerous deep valleys, some of which drain into the Medway and some into the Darent. Passing south from this plateau we descend its steeply scarped face to the Gault vale at its foot—about one mile in width.

A watershed crosses this at Lower St. Clere trending southwards, and falling to nearly 340 o.d. east of Kemsing Station. The lowest point is situated about half-a-mile south of Lower St. Clere.

The second plateau is that of the Lower Greensand, or Folkestone Beds, and is reached on ascending the steep slopes of Oldbury and Raspit Hill. The highest part of the former is about 600 o.d., and of the latter 658 o.d. One Tree and Wilmot Hills, close to the southern edge of this plateau rise well over 600 o.d., while Shingle Hill attains the greatest elevation of 700 o.d.

The northern face of this plateau is in our area. It is scored by deep

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ravines, of which the one at Styant's Bottom is a striking example. From the southern edge of this plateau the ground falls precipitously in places for nearly 100 feet. Near the foot the level falls quickly to 500 o.d., and more slowly to 400 o.d. at the base of the scarp. The fine valley of the Shode cuts right through this plateau. We come now to the second vale, that of the Weald Clay, which bounds our area to the south; the lowest part of this being between the 200 and 100 feet contour line.

RIVERS AND SPRINGS.

As we have here two watersheds (one to the north and one to the south) from off the two plateaus, we possess only the upper reaches of the streams.

The Shode may be termed our only river, and it is a remarkable one in many ways. It runs through a very fine valley, and the present river and an earlier one have together cut down this valley more than 100 feet at its deepest part. The whole valley is much deeper than this, but the higher parts of it (between 400 and 500 o.d.) must be referred to a much earlier period than that which the Shode gravels at 320 o.d. indicate. Some further remarks will be found in the Appendix.

The Shode rises as a Nailbourne or intermittent stream at Newhouse Farm, Yaldham, with branch streams from Styant's Bottom, Oldbury, and Boro' Green. It is also called the Buster or Bustey, perhaps from the violence and volume of the stream when at the maximum of its intermittent flow. It has no name on the Ordnance Map, but it is called the Plaxtol Brook in Topley's memoir of the Weald.

When we consider the deep gorge occupied by the stream at Highfield and compare it with the source, less than two miles away, when it rises at its highest point north of Newhouse Farm at 400 o.d. (as it did in 1904—the first time for very many years), and further consider that in former times the gradient may have been less than now, it seems almost impossible that this deep gorge can be due to the unaided action of the present stream, so that we have sought to call in an additional factor. We must however refer our readers to the Appendix for an account of this.

The Darent is only represented here by a tributary, rising on the west side of the St. Clere watershed and flowing to Otford, and having but a very short course in our area.

Swallow Holes. There are two of these: one where a stream, rising close to the base of the Tumulus at Redwell, disappears shortly after, in a garden north of, and close to, the road, and near the "Old House at Home" P.H. The other swallow-hole is about half-a-mile south of the Tumulus near Dale Cottage. So that it would appear that the Tumulus is as near as possible midway between these swallow-holes—a fact worth noting. One of these occurs in the Folkestone Beds but close to the boundary between them and the Hythe Beds, and the other at the junction of the Sandgate and Hythe Beds.

Springs. Taking those of the Chalk first, we find a very strong one north

of the Moat Farm, Neppicar, and another at the Spring Tavern, which has never been known to be dry, rises close to the junction of the Gault with the Chalk. Then we have similar ones south of Newhouse Farm; also at Kemsing, as St. Edith's Well in the village—a very powerful one, but dry the first time for many years in 1901-2-3. There are two others close by and a little west of this.

There are also some rather remarkable ones very high up on the slope of the Folkestone Beds, as at Oldbury Camp, Styant's Bottom, and Water Den, one mile west of this. These are all on one horizon, as if due to a bed of clay (Fuller's Earth perhaps) in these sands.

At Bastead, the Atherfield clay below the Hythe Beds throws out powerful springs all down the valley, as Plaxtol Spout, etc.

The Water Supply of the district is now almost entirely obtained by the Mid-Kent Water Works from deep wells sunk through the Chalk to the Folkestone Beds.

CHAPTER II.

GEOLOGICAL FEATURES.

(I). THE GEOLOGY OF THE DISTRICT AS INDICATED BY THE RAILWAY CUTTINGS.

RAILWAYS afford excellent means for getting an insight into the geology of any district. Much may be learned by using a small scale geological map of Great Britain, when travelling, and still more from the one-inch map of the Geological Survey.

In Sheet VI of this scale—in which our area is contained—we have two railway lines, by means of which we can learn much of the geology of the Weald; viz: the S. E. and C. Railway running from Swanley, via Oxtord, to Tunbridge Wells, and the branch of the L. B. and S. C. R. from the latter to Eastbourne, passing from the Chalk of the North Downs to the Chalk of the South Downs, and across all the underlying beds along the line of their dip.

At Swanley (S. E. and C. R.) the lowest division of the Tertiaries known as the Thanet Sands is well seen in the cutting near the station. These sands are rather clayey, and are dark coloured at their base where they make their junction with the Chalk. This junction is marked by a layer of green-coated flints locally termed "Bullhead." Further south we lose these sands and come unto the White Chalk and cross this formation, the beds succeeding one another in descending order, till we reach Oxtord where we pass on to the Chalk Marl. We here pass through the Escarpment or wall-like termination of the Chalk and reach the Gault clay beneath it, at a short distance south of the station. Here there are Brickyards where this clay is worked. This Gault tract, it will be seen, forms a valley, after crossing which we reach the Folkestone Beds, which underlie it, at Sevenoaks station; we also cross, on our way, the narrow valley formed by the Sandgate Beds. The next deep cutting and tunnel are in the Hythe Beds, at the south end of which the Atherfield Clay is slightly exposed. Then we cross the Weald Clay in the valley to Tunbridge, then the Hastings Sand of the Forest Ridge to Tunbridge Wells. This sand includes the following divisions viz:—

1. The Tunbridge Wells Sands, with the remarkable rocks, such as the Toad Rock, to be seen on the Commons.
2. The Grinstead Clay.
3. The Wadhurst Clay.
4. The Ashdown Sands.

From Tunbridge Wells to Eastbourne all the before-mentioned rocks are repeated in reverse order as we pass over the southern part of the Weald anticline or arch, till the Chalk is again reached at Eastbourne. As the train passes along the dip from north to south we have opportunities for noticing the upcoming of the various underlying beds, and how, in the one case, the dip is to the north ; and, as we pass Tunbridge Wells, that it is to the south, proving the elevation of the Weald, and that once the Chalk may have passed in an unbroken bed from the North Downs to the South Downs, and that part of it must subsequently have been removed, exposing the underlying beds as we now see them.

We will now take the line passing from Otford to the east, and we shall then see that the difference in the direction also has an influence in the difference of the order of the beds along it. We see that we pass generally at the foot of, and in a parallel direction with, the Chalk escarpment, and along what geologists call the line of "*strike*" (from a German word meaning the stretch or greatest extent of any bed). So that as long as we keep to the strike we shall always keep *along* the one formation, instead of passing *across* several, as we did when we went north and south along the *dip*.

Taking then the line running east from Otford we pass along the *strike* of the Gault to Kemsing Station and beyond it. The stiff blue clay is exposed in places, and slips will be seen to be of usual occurrence when the railway cutting is in clay. It should be noted also that these cuttings are made with a very low angle, hence if such a cutting were grassed so that no soil could be seen it would be a safe surmise that the low angle meant clay.

A little past Kemsing a bed of gravel caps the clay, and the water collecting in this gravel causes springs, with consequent slips in the clay : the slips thus formed are frequently filled in with a coarse material to allow a ready percolation of the water.

As the line now inclines to the south, we leave the Gault, and enter the sands of the Folkestone Beds just before we reach Wrotham Station, and here, where the line passes under the roadbridge, is a bed of gravel lying over the sand. This is an old river-gravel with no relation to that formed by the existing stream. In this gravel Mr. Harrison, several years ago, found Palaeolithic implements ; a most important and very interesting discovery, as no implements had up to then been found in such a high-level gravel : nor, indeed, had the presence of this gravel been previously noted.

At Wrotham Station the white sands of the Folkestone Beds are well-shown, while in the next cutting they change to a reddish colour, caused by the presence and staining of iron-oxide. The iron-ore, in thin bands, causes the very varied false-bedding to be well indicated, and presents a most curious wreathed and festooned appearance. This false-bedding also denotes that the Folkestone Beds must have been deposited as quickly shifting sandbanks and not very far from an ancient shore-line.

The line now passes over the turnpike road and into another cutting where the sands show, by their deeper stains a greater proportion of iron-oxide ; and in one part of the cutting, these sands are seen to be bent up into

a remarkably sharp arch, or anticline, forming as it were a sharp conical hill in the body of the cutting. This gives a very good idea of what the Wealden elevation looked like before the top was worn away.

We now leave the Folkestone Beds, as they trend to the north, and enter the Hythe Beds, though these are not well seen till we reach the deep cutting at Malling Station, where they are capped with an outlier of the Folkestone Beds. All the way now to Maidstone the alternate layers of hard Rag and soft Hassock, composing the Hythe Beds, are very well seen.

The line keeps along these until just before Bearstead is reached, when, on account of a sharp turn to the north-east, it is again brought on to the Folkestone Beds, well seen at Bearstead Station. This northerly direction being continued we come on to the Gault, along the *strike* of which the line runs all the way to Lenham.

As this brings us to the edge of Sheet VI we must now end our railway ramble, which illustrates most clearly the geology of our district to the north and south as far as their dip or thickness and least extent is concerned, and their *strike* or greatest extent to the west and east.

(II). GEOLOGY OF THE IGHTHAM AREA.

WHEN first the idea was entertained of writing this book, and especially the geological part, the task seemed easier than it afterwards proved.

As we proceeded with the work it was found necessary, in order to get a good grasp of the subject treated of, to go over the ground with the help of the 6-inch maps. We then found that it would be necessary to re-survey the Drift, which proved to be more extensive than those shown on the published 1-inch maps of the Geological Survey. Much better work can now be done on these larger scale maps which were not available when the 1-inch survey was prepared; also we could visit and re-visit the area at our leisure, which the officers of the Survey are not able to do.

The Drifts of course have been amply treated of in Topley's Memoir on "The Weald," a classic work; and then there are the valuable papers of Sir Joseph Prestwich, dealing specially with the Drift of this area. Our survey, though it cannot pretend to be in any way an exhaustive one, has enabled us to add to the drifts as shown on the published map of the Survey. The alluvial river deposits have been carried much closer to the sources of the rivers, with additional patches of the gravels of the older Shode and Darent where still visible, many of these, however, are hidden by pasture land laid down in recent years, though seen and noted by Mr. Harrison years ago; but unfortunately not mapped by him. We have been able to extend the area of the Brickearth, and a new Drift has been added—not hitherto mapped—for which we propose the name of "Scarp Drift," perhaps allied to the "head" of the west of England, and of much interest and importance.

But, as before remarked, the map in question is based on that formerly published by the Survey, and the lines for the older formations remain

practically as they were drawn. We may add that this mapping of the area has been not only most interesting but also most instructive in many ways, and has led to what appear to be some new views on the formation of certain valleys.

We would strongly advise those starting local research of any kind to furnish themselves with the 6-inch Ordnance maps of the district, and upon these to copy the geological lines from the published Geological Survey maps. Indeed no work of full value can well be done without the aid of these almost indispensable maps, and without their aid our re-survey would hardly have been possible.

GEOLOGICAL FORMATIONS.

The following is a brief account of the geological formations met with in our area, beginning with the oldest, viz:—

The Wealden. As the only member of this is the Weald Clay, and that is only just touched, but a brief notice of it is needed. The formation, though mainly composed of clay, contains beds of sand, sandstones and shelly limestones, furnishing some of the Sussex "marble." The fossils indicate that these rocks were laid down in the estuary of a great river or in a lake which brought down land plants and land animals, and mixed these with those living in brackish waters. They comprise Conifers, Cycads and Ferns; with Insects, Mollusca, Fishes and Reptiles, including several forms of Dinosauria. The thickness of the Weald Clay in our area is about 1,000 feet. Next comes the

Lower Greensand, comprising the following divisions in descending order:—

4. Folkestone Beds.
3. Sandgate Beds.
2. Hythe Beds.
1. Atherfield Clay.

Atherfield Clay, a name given by Dr. Fitton to strata at Atherfield in the Isle of Wight, consists of clay with beds of shelly rock and calcareous bands. Between Hythe and Sandgate it is 20 to 30 feet thick. We see hardly anything of it in our area as there are no openings exposing it, and it only just comes in on the border of the Weald Clay.

The Hythe Beds are well shewn and form an important feature. They are named from Hythe, on the coast of Kent, where they are well seen in the cliffs. They consist of limestones, sandstones, sand, and chert. Locally the beds are termed Rag and Hassock. The Rag is of a bluish-grey colour with fine grains of quartz and sometimes glauconite, and makes a very good building stone. The Hassock is a soft calcareous stone, and is sometimes a coarse impure sand or soft sandstone. Among the fossils we find plant remains, Annelids, Brachiopoda, (*Terebratulæ*), Mollusca, (*Lima*, *Pecten*, *Trigonia*, *Ammonites*, *Ancyloceras*, etc); Fishes, Reptiles (as *Iguanodon*, one of which was found by Mr. Benstead in 1834, at Maidstone). The Hythe Beds are 80 feet thick at Maidstone and 160 feet at Sevenoaks. They are of great economic importance, and are largely quarried (as at

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Boro' Green) for the Rag, for building stone and road metal. The Rag makes a good lime, but is more costly to burn than chalk.

The *Chert-bed*, which occurs on the top, is sometimes called the Seven-oaks-stone, and is well seen at Shingle Hill, where it is dug for road metal.

Tufa, a calcareous stone (deposited by springs from the Hythe Beds) containing much carbonate of lime is found occasionally now, as at Bastead and East Malling, and was used in the quoins in the early Norman churches. As it was easily cut and squared and hardened on exposure, it was a favourite building material in the earlier part of the twelfth century, when only primitive methods and tools were in use.

Sandgate Beds (so called from their being best seen at Sandgate near Folkestone. They consist of dark clayey sand and clay. The dark colour is due to green particles of glauconite (hydrous silicate of iron, potash and alumina). At the junction with the Hythe Beds a band of phosphatic nodules and pebbles is occasionally found, with casts of fossils and bored wood. The Fuller's Earth of Nutfield is obtained from this division. There are no sections to be seen in our area; and the beds are very thin and only occur here and there as pockets in hollows in the Hythe Beds.

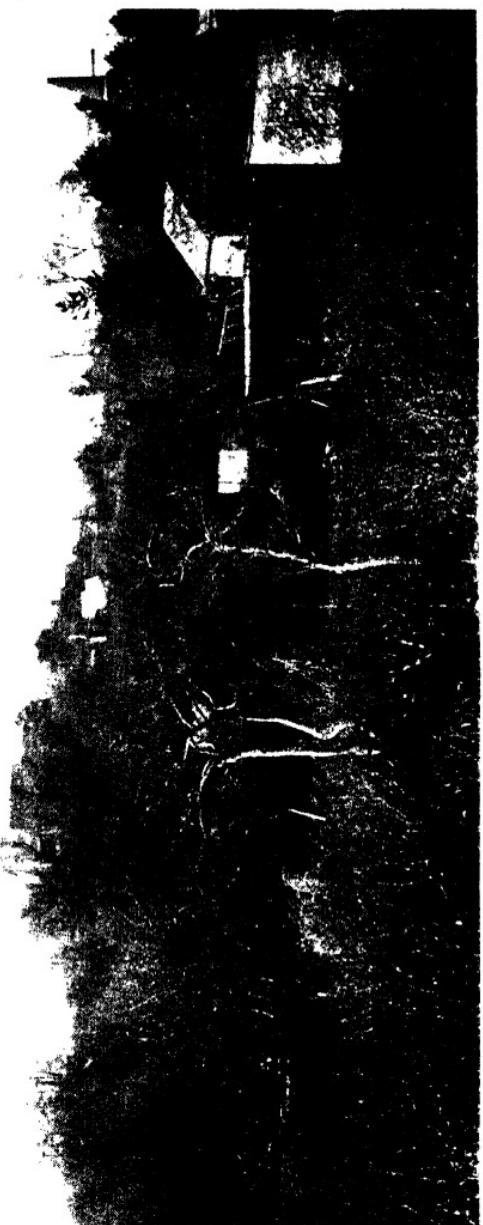
Folkestone Beds (well exposed in the cliffs at Folkestone). These consist of white and reddish sand, much false-bedded in places, with hard beds called carstone. It is usually a fine sand, but contains coarse gritty layers with large grains of quartz. In some places, as at Oldbury, the sand is very brightly coloured—crimson and yellow. At Ightham occurs the hard green grit known as the Ightham or Oldbury stone, once largely dug for road metal. It is well seen in the Rock Shelters at Oldbury; and the well marked dip-slope there is due to its hardness. These beds are about 120 feet thick. They are not very fossiliferous, especially at Ightham, but contain some of the following fossils:—*Arca*, *Lima*, *Ostrea*, *Pecten*, *Terebratula*, *Rhynchonella*, *Serpula*, *Ichthyosaurus*, *Campylodon*. Many of the shells occur as casts.

Glass sand is dug from the Folkestone Beds. The Lower Greensand is a marine formation, showing that the land slowly sank after Wealden times; and its false bedded sands indicate rapid currents and show they were deposited not far from the shore. The Lower Greensand thins to the N.E.: S.E.: and E: being only 41 feet thick at Chatham, 70 at Eastbourne and 31 beneath Dover. This indicates that the sea that then existed at these places was a shallow one and the land not far away.

We now come to the Upper Cretaceous formations, comprising the Gault and the Chalk—the Upper Greensand being absent in East Kent.

Gault, so called from a local name in Cambridgeshire meaning a stiff clay, is of a blue or bluish-grey colour, sometimes calcareous, and contains septaria, crystals, and nodules of iron pyrites. The fossils also are highly pyritised.

It is very thick near Ightham, being 280 feet thick in a well at Oftord, and 214 feet at Halling, while at Dover it is only 143 feet thick. The Lower Gault seems to have been deposited in a sea of from 50 to 70 fathoms deep, while the Upper Gault indicates a sea-depth of 100 fathoms and upward.



The pits at Otford and Dunton Green Kilns shew very good exposures; it is also dug at the Boro' Green Kiln.

Fossils are numerous in places, with many Corals, Foraminifera and Ammonites; also Crustacea, Fishes and Saurians.

The abnormal thickness of the Gault here coupled with the Upper Gault shows that it represents the Upper Greensand of other places.

Chalk. As we have seen, the Cretaceous sea was deepening, as the Gault sea was much deeper than that of the Lower Greensand; and it is estimated that the Chalk sea was deeper still, viz: from 400 to 2000 fathoms. Chalk is essentially a white limestone and almost wholly composed of carbonate of lime, with the lower beds less pure than the upper. It is sandy at times and at others marly. Seams of laminated marl also occur in the upper beds. The bedding at times is massive, at others thin. It is also much jointed. In the upper beds nodules of black and grey flints occur—also in tabular veins. It also contains nodules of pyrites. Occasionally erratic boulders—such as granite—have been found in the Chalk. Chalk consists to a large extent of shells of Foraminifera. It extended at one time over the greater part of England and Wales.

Chalk is divided into three divisions—Upper, Middle and Lower: with many flints in the first, few in the second and none in the third. The total thickness of these in our area is about 400 feet—thickening further to the north to about 700 feet.

Of the large pits at Wrotham—the only ones in our area—the lower one is mostly in the Middle Chalk (which is there burnt for lime), and the upper one continues this to the Upper Chalk. The Upper Chalk just caps the top of the escarpment, which is mainly composed of the Middle Chalk with the Lower Chalk at the base.

Fossils. These are numerous. The most common are the Echinoderms, or Sea-urchins. Some known as Cyphosoma are popularly called "Shepherds' Crowns." Sponges are common, and Fishes and Crustacea are not unusual, while Saurians and Birds (as Enaliornis) also have been found.

With the Chalk ends the Secondary division which is characterised by Marsupials, Mammals, Reptiles, Mollusca, Brachiopoda, and Cycadiform Plants.

The next division is that of the

TERTIARY.

Only two members of the lower and one of the upper part of this large and varied division are represented. They exhibit marine, estuarine, fresh-water, and terrestrial conditions.

The Lower London Tertiaries are represented by the Woolwich and Reading and the Oldhaven Beds.

Woolwich and Reading Beds. This name was given by Sir Joseph Prestwich, in 1853, from those places, where they are well seen. They consist of alternations of mottled clay, loam and sands variegated in colour, with pebble-beds of rolled flints, sometimes hardened into a stone called pudding-

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stone. This stone is remarkable for the fact that when it breaks it does so along joint planes with a clean and even fracture right through the pebbles and their siliceous matrix. The beds vary in thickness from 15 to 90ft. in the London Basin. At Upnor, near Rochester, they consist of sands and shelly clays, with a bed of small flint-pebbles at the base, and are 50ft. thick. The fossils comprise Mammals, Birds, Reptiles, Fishes, Mollusca, Polyzoa, Crustacea, Sponges, Foraminifera, and Plants. They indicate marine, estuarine, and freshwater conditions, and shew a great elevation of the Chalk from the deep sea of the Cretaceous period.

Though our area includes no section where these beds are worked, we have included them, as we think that much of the extensive deposit known as Clay-with-flints, mapped over so much of the Chalk plateau, must be largely composed of the Woolwich and Reading Beds, for when any deep cuttings have been made a considerable thickness of the mottled clay and sand of this formation has been met with—as at the Reservoirs at Terry's Lodge and near the Vigo.

Oldhaven and Blackheath Beds, a name given by Mr. Whitaker, in 1866, to the sands and pebble-beds above the Woolwich Beds in Kent and between them and the London Clay.

As these pebble-beds contain no partly-worn flints, Mr. Whitaker considers that they could not have been formed as a beach upon a chalk shore, and he infers that they must have been deposited some way off the shore as a bank. In some places the strata rests unconformably on the Chalk, as just outside our area at Knockmill and Holly Hill.

Fossils.—Near Higham, in the Hundred of Hoo, east of Gravesend, a railway cutting shewed London Clay resting on 12 feet of Oldhaven Beds which yielded Cardium, Corbula, Pectunculus and Natica.

PLIOCENE.

Lenham Beds. The only member of the Pliocene Division are the Crag deposits at Lenham, on the Chalk plateau at 600ft. o.d., originally described by Prestwich. We mention them, as, on the plateau in our area, ironstone, similar to that at Lenham, occasionally occurs; but not, so far as we know, containing any fossils; though this affords no reason why true Lenham Beds should not be found here. The existence of the Lenham Beds is a matter of much interest and importance, as their occurrence suggests a submergence of the South of England, during Pliocene times. For further information as to the Lenham Beds see the Pliocene Memoir, by Mr. Clement Reid, F.R.S.

QUATERNARY PERIOD.

This term, introduced in 1854 by A. Morlot, includes the Post-Tertiary or Post-Pliocene deposits. They differ so much in character, distribution, and position, from the Tertiary, that, though they cannot compare with the Primary or Secondary in thickness or in life-history, they seem to demand a distinctive name. They have a much wider range and possess more varied

characteristics than the older divisions, and have the distinction of containing probably the earliest evidences of Man—this alone being a claim of much weight, interest, and importance. Many geologists, indeed, object to the name, but we here follow Mr. H. B. Woodward, F.R.S., to whose indispensable work and great storehouse of well-arranged information, *viz.*, the "Geology of England and Wales," we have been so much indebted in the geological part of this work.

The Quaternary Period has been divided into :—

Recent,
Pleistocene.

The *Pleistocene*, named by Lyell, in 1830, includes terrestrial, alluvial, estuarine, marine, and glacial accumulations; and the organic remains associated with the relics of Palæolithic Man found in caverns and river deposits.

The distribution, too, of land and water, differed very much from that of the Tertiary Period, and the latter part of it brings us to that of to-day. In the earlier part the land mass of the British Isles was in striking contrast to that now seen. This is very well exhibited in Plate XIV of Mr. Jukes-Browne's "Building of the British Isles," showing the geography of the Pleistocene times—when the coast-line coincided with the contour of 80 fathoms. England and Ireland were then joined on the North to Scandinavia and on the South to Europe. We have seen that the climate in Pliocene times, to which the Lenham Beds belong, had become much colder, and the land was then depressed to a lower level than now. But in Pleistocene times there must have been a rise of several hundred feet. This would be sufficient, combined perhaps with a change in the direction of the Gulf Stream, to bring on the great increase in cold, and the formation of the great thickness of ice that must have prevailed at the Glacial Period.

That the South of England escaped glacial conditions of a modified nature it seems very difficult to imagine.

This period presents in many ways far more difficulty than the last, in the classification both of the age and of the order of deposits. We have a great lack of fossil evidence just where we most need it, and the shells are mostly fragile and not completely fossilized. Fossil Pleistocene Man in this country may hardly be said to exist, as the evidence is slight and not absolutely conclusive. The now fully-accepted, but once fiercely-disputed, flint implements are, we may say, the only human fossil evidence we have. The acceptance of these, as the admitted handiwork of Man, was therefore a great step gained, and a foundation (scanty, no doubt) on which to build his Life History: and so of supreme interest and importance.

We have found much difficulty in treating the deposits of this period in our area, as they are scanty and not to be discerned without a long and painstaking survey of the ground; and their classification is by no means easy. Our debt to Mr. Harrison is great, as he, when quite a young man, seemed able to estimate their importance, at a time, too, when much less attention was paid to such matters than is now the case.

The Story of Ightham.

Instead of the thick, widely-spread and easily recognised deposits of the preceding periods, those in our area especially consist often of quite small patches and thin sheets of surface gravels and clays, requiring a very close scrutiny both of their component parts and of the percentages of these to distinguish them. The flint implements, too, require an apprenticeship before they can be readily detected, and some folk fail to acquire this faculty. A small hill-top, crowned by a gravel found to contain these remains of man, may tell a tale of deep import and interest in the past history of that spot and of man himself. For that hill, the gravel having been determined to be a river-gravel, may (strange as it may appear) have formed part of a long-vanished river valley. Then the course of that river may be partially traced after careful survey of the immediate area and much patient deduction. Again, some high-lying and perhaps quite thin and small patch of brickearth may point to the former existence of a lake where, otherwise, none would have been suspected. Then, quite a thin seam of clay may arrest the attention and, being taken home and carefully washed, may be found to contain small shells and minute seeds, which perhaps afford evidence of considerable changes both in climate and in the distribution of land and water.

Some of the most important gravel deposits of our area do not extend over 10 acres or exceed 8 feet in thickness and are often much less than this, and we can, of course, only discern them where the ground is under cultivation; so that it will be seen how much is hidden, and lost to the geologist, by pasture land.

The Pleistocene period is also important from the fact that many features of the country as we *now* see it, were *initiated* and mostly began to be carved out, during the latter part of it; so that we must shut our eyes to the present features and fill up, in imagination, most of the valleys, if we wish to study truly their past history.

Some idea of the difficulty of this task will be gained by taking our stand where a bird's-eye view of the Weald may be obtained, and restoring it, in imagination, to undulating plains where *now* deep valleys and well-marked hill-ranges fill the eye. In history it is just the same—the influence of the present prevents and *must* prevent us from making a proper re-construction of the past, strive how we may to withstand it.

This period then, no less than the others, calls upon our imaginative powers: and these must be cultivated before we can properly understand all past events.

Plateau Gravels. From their position on the highest parts of the chalk plateau, their deep staining and much worn condition, these gravels are considered to rank as the oldest in the area, and were classed by Sir Joseph Prestwich (in an elaborate and remarkable paper on "The Occurrence of Palaeolithic Flint Implements in the neighbourhood of Ightham, Kent, their distribution, and probable age" [Q. J. Geol. Soc., May, 1889]) as *Pre-Glacial*, meaning by this that they were formed just before the Glacial Epoch commenced.

The rude implements associated with these Plateau Gravels, as being only found where such occurred, were accepted by Sir Joseph Prestwich as man's

earliest work. When the paper above referred to was written they had only been found on the surface, and objection was taken to them as being mere surface finds, Mr. Harrison however stated that he was certain they would be found *in situ* in the gravels. A grant was made by the British Association and pits were sunk on the sites of the surface deposits. The result fully proved Mr. Harrison's point. Unfortunately Sir Joseph Prestwich died before he could visit these pits.

As the writer had never seen these pits (they having been filled up) he helped Mr. Harrison to sink another on the same site. He was particularly led to do this as he found, during a discussion on the subject at the Belfast British Association Meeting 1902, that it was asserted, by all those who spoke against the Eoliths, that Palæoliths and Eoliths occurred side by side in the pits at Parsonage Farm, Ash. Now the fresh pit sunk in October, 1902, fully confirmed the evidence afforded by the others. It was kept open for some time, but none of those who had spoken against the Eoliths came to see it.

We here give an account of the beds sunk through the thickness of the drift, seven feet thick, before the Tertiary Sands below were reached.

The beds were—in descending order—

1. *Dark sandy loam*, with scattered flints and pebbles, and some worked flints.
2. *Lighter coloured loam*, as above, getting stiffer at the base.
3. *Coarse compact gravel of flints and pebbles*, some of the flints much worn, some large and little worn, and some whitish : in a grey clay matrix. The pebbles varied from 27 to 50%, getting more numerous below. The proportion of worked Eoliths to unworked varied from 4 to 9%, and some of these appeared to be striated.*
4. *A very stiff, yellow and grey clay*, mostly clean, but with a few stones, some of them worked.
5. *Coarse ferruginous sand* stained with manganese.
6. *Yellow Tertiary sands* with a few pebbles.

As will be seen, the drift varied very much in composition. The tertiary sand came much nearer the surface on the west side of the pit, and the drift occurred very irregularly on it.

As no derived fossils occurred in the drift it cannot be stated whence the yellow and grey clay came.

The very irregular junction of the drift and Tertiaries, and the striations, may be due to foundering consequent on the solution of the underlying chalk.

As this drift occurs on the highest ground in our area, the evidence seems to point to even greater heights to the south as its gathering ground. These no longer exist, but before the present features were cut out they must have existed and have been denuded ; so that this would give a very considerable age to the plateau drift.

Another pit was sunk during the same year on the edge of the plateau and the chalk escarpment at Terry's Lodge at 770 o.p. This shewed stony

* A well striated Eolith may be seen in the Harrison Collection at Maidstone Museum.

loam three feet thick, with Eoliths, resting on a red clay drift, with flints, containing no Eoliths, and these in turn on Tertiary sand. Though the junction with the sand was not actually seen in this pit, it was seen in 1900 in the section at the Reservoir close by and at the same level. This red clay-with-flints then, as it rests on the Tertiary Sands, (and these were seen to rest on the Chalk at the Reservoir), cannot directly be the well-known deposit referred by Mr. Whitaker, F.R.S. to the slow dissolution of the Chalk, leaving behind a red clay containing the flints from the Chalk as the product.* But, as it so much resembles it, it may be made from it, and may have been carried some distance from the south, perhaps by the agency of ice. As it is considered that the Wealden crest was perhaps 2000 to 3000 feet higher than now,† this elevation would in early glacial times almost certainly have been snow-capped at times, and may have given rise to glaciers on a minor scale, and by these the plateau drift may have been brought down.

This Plateau Gravel occurs only in small thin patches, and can only be seen where the land has been cultivated.

High Level Gravels. These gravels occur at lower levels than, and are quite distinct from the Plateau Gravels, they were classed by Sir Joseph Prestwich‡ as of uncertain age and possibly glacial, are found in patches covering very small surfaces, are not easily made out, and consist mostly of white angular little-worn flints, with ironstone, chert, and a few pebbles, sometimes—as at Pascal's and at Boro' Green Brickyard—embedded in the Gault clay. They occur also on the slope of Oldbury, at Crouch, Crowhurst and at Rose Wood, Highlands, Gallows Hill and Gover Hill.

Scanty as are these gravels they are of much interest, as Sir Joseph Prestwich considered them to throw light on the Denudation of the Weald. For one very great matter for surprise, and one great difficulty in accounting for the Denudation of the Weald has ever been, that (considering the enormous amount of material removed, perhaps 2000 feet from the crest of the Weald), we have so few drift beds representing in any way this vast amount removed from over so great an area. Sir Joseph Prestwich felt this great difficulty and could not see that either Sir Andrew Ramsay or Mr. Topley had met it in their explanation of the denudation of the Weald. Sir Joseph considered that, taking the case of the cutting back of the Chalk escarpment—from perhaps some twelve or fourteen miles further south than it now stands, some of this waste should still be found. Now the white flints, found very thinly on the high ground round Ightham, as at Crowhurst, Crouch and Gallows Hill, and also at a lower level and embedded in the Gault at Boro' Green and Pascals' Brickyard, and the few Tertiary pebbles associated with them may (as Sir Joseph Prestwich considered§) represent the waste of the Chalk and the Tertiary beds that once covered it.

This drift, indeed, could hardly have been derived except from the waste

* See also Q. J. G. S., Vol. lxii, p. 132.

† Q. J. Geol. Soc., Vol., 46, p. 169.

‡ Loc. cit.

§ "Drift Stages of the Darent Valley." Q. J. of Geol. Soc., May, 1891, Vol. xlvi.

of the Chalk. The flints are large, angular, and little worn ; and so could not have been transported from a distance.

Scarp Drift. The scanty evidence of a drift that should represent in some way the great waste of the Chalk escarpment has, ever since my residence at Malling, presented a problem that seemed to call for some attempt at solution.

Living in view of the Chalk scarp, and of the great gap cut by the Medway, these seemed problems that daily challenged attention. Noting, for one thing, that the chalk-with-flints is thin on the edge of the chalk escarpment, it would appear that the waste must be confined to the Middle and Lower divisions of the Chalk (leaving out of account any possible capping of Tertiaries) which are practically flintless. So that we must look for a drift almost made up of chalky matter.

At the foot of the Chalk scarp and running up the coombes are broad ledges or terraces. These look like terraces of a chalky drift concealing the true valley floor. Closer inspection revealed that this surface was largely composed of rounded pellets of chalk. So that, on this evidence, the mapping was commenced of this chalky drift. These ledges or terraces are separated by spurs and knolls of chalk, bare of this drift at and near their summits, thus representing rather old land surfaces. Very soon after the mapping of this drift was begun, full confirmatory evidence was found on visiting the cuttings of the tram-lines of the cement works that run up the dry chalk valleys to the huge pits dug out of the face of the scarp. These cuttings through some of these flat valley bottoms show a considerable thickness of this drift, composed of pellets of chalk—with very few flints, mostly large and unworn. Sometimes this drift is roughly current-bedded. It also contains marly beds of finely washed chalk, and these, when occurring at the surface, form a buff loam, finally merging, in the lower ground, into a brown sandy loam or mild brick-earth, sometimes underlaid by the pelletty chalk containing, where thin, recent land shells. This loam seems due to the decalcification of the pelletty chalk, and various stages of this passage into the loam can be seen in these cuttings, which however are outside our area. The best section of the Scarp Drift in our area is along the Pilgrim's Road in the part lately widened between Wrotham and Newhouse Farm where the Scarp Drift rests on the Lower Chalk. The section shews from three to six feet of fine chalky drift with a layer of unworn flints at the bottom and a few land shells, resting on the Lower Chalk.

The conclusions come to from the mapping of the Scarp Drift. The mapping of this Drift has proved most instructive, and seems to throw additional light on the Denudation of the Weald as far as the cutting back of the escarpment is concerned.

While the drawing of the line along the escarpment, naturally the first line to start with, was a comparatively easy one, the finding of a southern boundary was a much more difficult matter owing to the great waste due to the denudation of the drift after it was laid down. This occupied us some three years, and this line from Seal on the west to West Malling on

the east, has many doubtful places where there was little or no evidence to go upon, due very often to the prevalence of pasture land hiding the nature of the soil.

Roughly speaking, this line, starting from West Malling, keeps generally a little north of the Railway line as far as Ightham, whence to Seal it is a little south of it. It ends as a rule near the outcrop of the Lower Greensand. Just south of this base line are outliers of gravel, which are capped by a mixture of Scarp and Southern Drift.

While we cannot assert of this line that here began the chalk escarpment, especially as Sir J. Prestwich thought that it extended some ten miles further South,* we submit that this line seems intimately connected with the foot of the chalk escarpment at a very late stage of its existence.

We are quite aware that we are here trenching on a very debatable ground, but we think that the mapping warrants an attempt at some such conclusion.

This also shows how much more work still remains to be done among the Drifts within the Weald.

In this Scarp Drift we have included the High and Lower Gravels of Prestwich with the Brickearth associated with them. The outliers mapped south of this line indicate, we think, the remains of a debatable line between the Scarp and the Southern Drift, as here they seem to be commingled. A little further south traces of the Scarp Drift get fainter.

The Southern Drifts of course belong to a much earlier period before the Escarpment was begun at all and the Scarp Drift to a much later one in its history.

Brickearth. We are now lead to the consideration of the high and low-level Brickearths of our area. Here, we should repeat, that to gain any true idea of past periods—especially this one so near our own—we must get away from the present as much as possible. *Then* it was a time of great elevations and corresponding depressions and of much waste by denudation—due to various agencies, coupled, perhaps, with great extremes of heat and cold. *Now* we seem to have arrived at an almost stationary condition of things compared with the past.

The present rivers have cut their way down so deeply that their gradients are much less than they were, and so their excavating powers are less. The land movements may almost be considered as stopped, for the time at least.

It is only when our rivers have been temporarily swollen by an unusually heavy rainfall that they seem forced into action and seem capable of doing any destructive work. It is then only that we can realize—under these abnormal aspects—what their normal conditions in the past may have been.

High-level Brickearth. This is a mere remnant,—a high and dry stranded deposit—of what once must have been a far more extensive one. The evidence, though scanty, is of the utmost interest, as here we must again

* See page 23.

use our imagination to reproduce the past conditions under which it may have been laid down.

Clays of all kinds—and some hold clay to be merely a result of mechanical rather than chemical agencies, as representing the finest possible divided state of matter, regardless of composition*—must have been deposited in quiet waters and in the undisturbed bends of streams, or in the still bottoms of lakes, and so free from current action. Some loams, also, may perhaps have been wind-drifted.

These high-level Brickearths are situated at the heads of valleys, as at Styant's Bottom, Crown Point, one-and-a-half miles west of Ightham. Here three to four feet of brown sandy loam occurs on both sides of the deep valley, running up to and past Crown Point. It is worked only on the west side and rests very irregularly on the sands of the Folkestone Beds.

A few Palæolithic flakes have been found there. About half-a-mile further along the high road Mr. Harrison tells me Brickearth was dug at the head of another valley, and still further west, at Saxby's Brickworks, at the cross-roads to Stone Street (at 560 o.d.—rather higher ground than the last) similar brickearth was dug.

But as the heads of these valleys are now quite cut off from the main valley below—which at its lowest runs at about 300 feet o.d.—something like 250 feet must have been cut down since this Brickearth was deposited, and this makes it of considerable age.

The Holmesdale valley must, *then*, have been occupied by a broad river, in the still upper reaches of which this Brickearth may have been laid down.

Lower-level Brickearths. These occupy a much wider area than the last and can be much better seen; but as they contain no remains of any kind, unless we correlate them with the Ightham Fissure deposit, which contains a loam, we have no more fossil evidence than in the former case. For further information on this subject see the article by Mr. Abbot in the Appendix.

This lower-level Brickearth is seen in three Brickyards, viz: at Pascal's Kiln, at the Boro' Green Kiln (north of the Station), and at the one south of the Station; and also in pockets in the sand-pit by the "Black Horse" Inn. There is also pelletty chalk in it. Unworn flints and pebbles also occur in all these sections. All this seems to point to the derivation of this loam from the waste of the chalk escarpment by the dissolution of the chalky matter in the fine chalky drift and the conversion of this into a sandy loam.

Lower-level Gravel. The most marked patch of this gravel, perhaps, is that which caps the hill known as Highfield, a little above and east of Ightham. A hole dug here proved the gravel to be about 8 feet thick. The height is 320 feet o.d. or 60 feet above the present Shode, and so must belong to an older Shode gravel when that river flowed at a level 60 feet higher than now. According to Sir Joseph Prestwich† the composition of this gravel (in descending order) is as follows:—

* See A. D. Hall, "The Soil," 1903, p. 34 to 36

† Loc. cit.

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1. Sub-angular white flints (some of them pitted), together with a few much-worn and deeply-stained brown flints about 50%.
2. Lower Greensand debris, consisting of sub-angular fragments of chert, grit, ironstone and Oldbury stone about 45%.
3. Tertiary Flint pebbles about 5%

Another marked patch is at Coney-field where the gravel may be seen capping the Railway cutting south of Ightham Court House. It may also be seen at Fane Hill and Bayshaw at about from 300 to 330 feet o.d.

Mr. Harrison has discovered Palæolithic Flint Implements in all these gravels.

At Dunk's Green, lower down the Shode Valley, similar gravel occurs—only that there for the first time Wealden pebbles occur and also large blocks of Oldbury stone, some 2 cwt. and more in weight.

Residual Drift. This is a term not found in geological Text Books, though in Hall the term "sedentary soil" would be an equivalent for it.* Hitherto all the Drifts of which we have treated, (with the exception of the Scarp drift), have been Drifts of Transport, moved, that is, either by the agency of water, or by ice, or perhaps wind, from their original location. But reflection must show that denudation may, indeed must, also take place vertically and downwards by a dissolution of the permeable beds and the leaving behind of the insoluble residue.

There is no doubt that this residual drift widely covers the chalk in our area but only very thinly, and we hold that much of that which has been included with the Clay-with-Flints, especially where it is thick and not distinguishable from the Woolwich and Reading Beds, must belong to that formation, especially when underlaid by sand. (see p. 10).

The Folkestone Beds, also, in places, are seen thickly covered with a cherty deposit, some of it much weathered by long exposure. As the chert belongs to the Folkestone Beds it cannot have been derived or transported. So this cherty spread may be regarded as a residual drift.

We see the same in the Hythe Beds. They consist of a Ragstone, very cherty sometimes, and a soft calcareous sandy bed (the Hassock). The downward percolation of carbonated water would remove the calcareous matter, forming a reddish clay in places, and the sandy residue would be acted on by the wind: and the result would be that here and there on the highest ground we find considerable areas covered with a residual drift of the insoluble parts of the Rag, so thick in some instances as to form a kind of angular gravel.

It appears, then, that beds may be reduced in thickness vertically, by the downward percolation of water, acting mechanically as well as chemically, and thus bringing together hard beds once separated, perhaps, by considerable thicknesses of softer beds.

* A. D. Hall, "The Soil," 1903, p. 7.

CHAPTER III.

THE FORMATION OF THE WEALDEN ANTICLINE AND THE DENUDATION OF THE WEALD.

Formation of the Wealden Anticline. All the strata mentioned in our geological section have, as will be seen, been deposited under water, and this will be found to be the case with many of the older beds, though afterwards some of the latter were much altered by volcanic action, others are, however, of volcanic origin entirely, but not in this part of England.

The strata having been laid down in water, they must—when all the original inequalities of the old rock surface had been filled up—have been deposited horizontally. Thus the cretaceous series must have been laid the one over the other in horizontal sheets; the chalk, for instance, covering a vast area. In our case, as we have seen, it must have stretched as an unbroken bed, from the North to the South Downs. It is clear that had this horizontality been maintained, with nothing to disturb it, we could never have had the rapid succession of beds such as the railway cuttings disclose, (see p. 4).

Denudation by rain and rivers, or even glaciation on a wide scale, could hardly have effected this exposure, and even if such were the case the sharp dips and general inclinations away from the central ridge of the Weald would never have been effected by the mere cutting down of the overlying beds.

The effect of such denudation would be merely the erosion of river courses of a shallow character with the same beds repeated on either bank, it seems clear, therefore, that some upheaval on a vast scale must have taken place, and as the Tertiaries that overlie the Chalk show a corresponding inclination, we may date this upheaval from towards the close of that period. This re-appearance of beds formerly hidden is due to an upheaval on a great scale in a line from West to East, reaching from the Mendip Hills into Belgium. The result of similar disturbance is seen in the Isle of Wight which, though dating also from the same period, may yet have been initiated along an old line of shrinkage, as far back as Palæozoic times. These upheavals took place with certain pauses and were not effected all at once.

Sub-aerial denudation, such as rain and rivers, aided no doubt by ice, acting along the lines of weakness caused by the unequal yielding of rocks

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of different composition and hardness, bent up by force of volcanic origin, were the great factors in the denudation of the Weald.

Denudation of the Weald. The Denudation of the Weald, besides being one of the principal points in the Geology of our Islands, may be looked upon as the key to the Geology of our area; we therefore propose to go into the whole question somewhat fully.

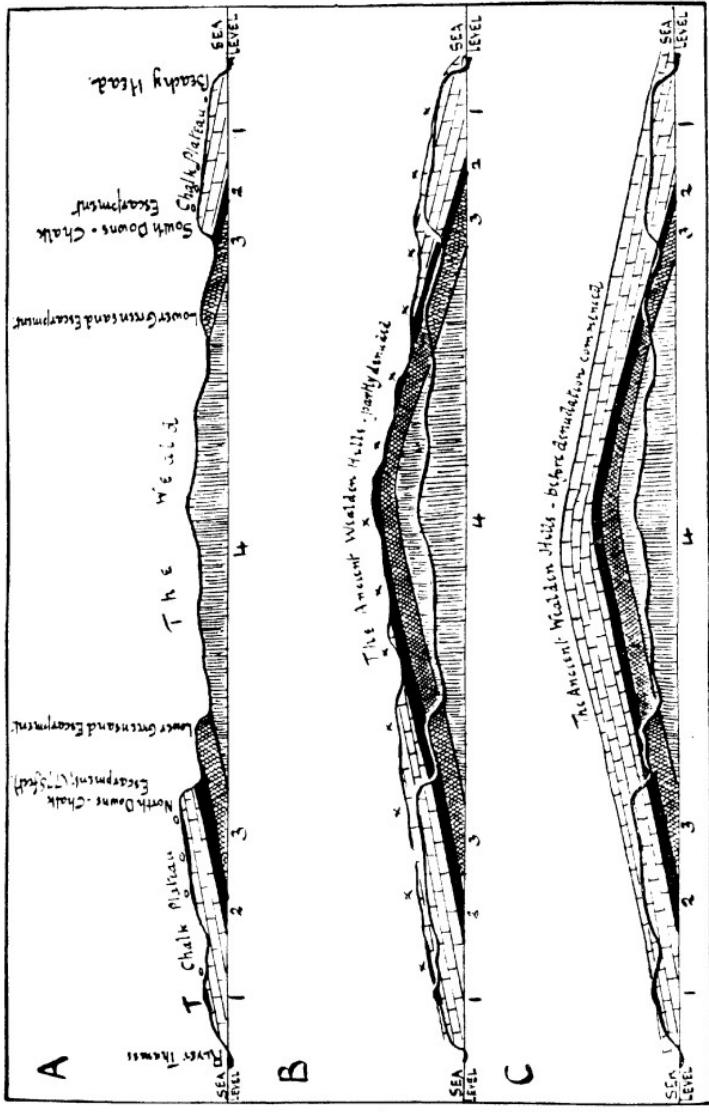
We will first take the theory put forward by Prof. Ramsay in his most widely read "Physical Geology and Geography of Great Britain"—a theory adopted by Topley in his "Memoir of the Weald," and generally accepted then and for some time after, but now open, as far as some points are concerned, to disputation, which we will allude to later on.

Quoting from Prof. Ramsay:—

"There can be no doubt that the Chalk and the underlying formations of Upper Greensand, Gault, Lower Greensand, and Weald Clay originally extended across the whole area of the Weald for a breadth of from twenty to forty miles from North to South: and nearly eighty miles from East to West.

"This vast mass, many hundreds of feet thick has been swept away, partly by the wasting power of the sea, but chiefly by atmospheric agencies: so much so, indeed, that all the present details, great and small, of the form of the ground, are due to the latter. The main features are shown in the following diagram, the height of which has been purposely exaggerated, so as to bring them prominently before the eye.

"The idea that the Wealden area once formed a vast oblong bay, of which the chalk hills were the coast cliffs, is exceedingly tempting; for, standing on the edge of the North Downs near Folkestone and looking West towards Ashford and South-west across the Romney Marsh, it is impossible not to compare the broad flat to a sea overlooked by bays and headlands, which the winding outlines of the chalk escarpment, both of the North and South Downs, are sure to suggest. . . . It is obvious, however, that the base of the Chalk and Upper Greensand all round the Weald from Folkstone to Eastbourne, could not have formed a continuous shore line in recent times. . . . Therefore the form of the ground in the Wealden area has been mainly brought about by atmospheric causes, and the operation of rain and running waters. One great effect of the action of the sea, combined with atmospheric waste, when prolonged over great periods of time, is to produce extensive plains of marine denudation, for this combined result is to plane off, as it were, the asperities of the land, and reduce it to an average tidal level. Suppose the old curvature of the various formations across the Wealden area to be restored by dotted lines (as in Fig. 133), which is very nearly on a true scale. Let the upper part of the curve be planed across, as shown in the figure, and let the newly-planed surface, slightly inclined



Impression of my impression, from Mr. Bentons Harps, on my first drawing, an outline of the History of the English Flint implements.

To prevent the country getting older,
In consequence of time passing, between A and C, showing the Wolds Hills in a partly denuded condition, as they may possibly have
existed when I first implemented were made,



" from the interior, be represented by the line (p.p.). Towards this line, " the various masses of the Hastings sand, (h.h.), Weald clay, (w.), and " the Lower Greensand, (s.), the Gault, (g.), and the Chalk and Upper " Greensand, (c.), would crop up. Then, by the aid of rain and running " water, large parts of these strata would necessarily be cut away by " degrees, so as to produce in time a new configuration of the ground. " If it were not so, we might expect the rivers of the Wealden area " should all flow out at its eastern sea-border, through long east and " west hollows, previously scooped out, where the ground is now low, " by the assumed wasting power of the sea, towards which the long " plains of Gault and Weald Clay now directly lead.

" But this, except with certain rivulets, is so far from being the case, " that the river Beult rises only ten miles from the sea coast and flows " westward. If, on the other hand, such a plain as p.p. once existed, " it is easy to understand how the rivers in old times flowed from a low " central watershed to the north and south across the top of the chalk, " at elevations at least as high as, and probably even higher than, the " present summit levels of the Downs.

" Then as by the action of running water, the general level of the " inner country was being unequally reduced, so as to form tributary " streams, each cutting out its own valley, the greater rivers, augmented " in volume by these tributaries, were all the while busy cutting and " deepening those north and south channels through the Chalk Downs, " now known as the valleys of the Stour, the Medway, the Dart, the " Mole, and the Wey which run athwart the North Downs; and the " Arun, the Adur, and the Cuckmere, which flow southwards through " gaps in the South Downs.

" On any other supposition it is not easy to understand how these " channels were formed, unless they were produced by fractures, or by " marine denudation, of neither of which is there any proof. " We get a strong hint of the probable truth of this hypothesis con- " cerning the denudation of the weald, in the present form of the " ground. The absence of flints from nearly the whole of " the Wealden area, excepting near the Downs, is easily explained by " this hypothesis, for the original marine denudation had removed all " the chalk, except near the margin, long before the rivers had begun " simultaneously to scoop out the valleys of the interior, and to cut the " transverse valleys across the North and South Downs.

" It is believed that excepting for a short distance along the coast, " this southern part of England was not depressed beneath the sea " during any part of the glacial period. It has, therefore, been above " water for a very long time. During the Miocene period it must have " been subjected to much sub-aerial denudation. High up near the " edge of the North Downs, however, certain fragmentary outliers of " crag, described by Prof. Prestwich, are preserved in pockets of the " chalk at Lenham and Paddleworth, and other places. These Pliocene " beds must have been deposited upon that old plain; and, indeed, the

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"marine denudation, initiated perhaps in Eocene times, may have then been largely effected."

"The 'Denudation of the Weald' has given rise to much theorising by distinguished authors, but it may now be said to be due to the sub-aerial erosion that followed the wide-spread marine action. Thus the outer crust of the Chalk, that once cased all the strata of the great anticlinal curve, having been *planed off*, and, by subsequent elevation, a table-land having been formed, the different rocks that cropped up to the surface of this plane were attacked by rain and rivers, and worn away so as to form by degrees the hills and valleys of the district, including the great escarpments of the North and South Downs. The features have been modified at various periods since Eocene times, and during the Pleistocene period some of the chalk valleys were deepened and some 'coombes' may have been formed."

This, then, is Prof. Ramsay's theory, and we must confess some difficulty in understanding parts of it, and have found this difficulty shared by others. So that, should some be moved to study the theory on the spot, they may rest assured that much yet remains to be done to solve a problem which, we submit, has not yet been wholly solved.

We feel tempted to point out what, to us, seems a most important contradiction that still further militates against an understanding of this theory. In the latter part of our quotation occur these words:—

"If, on the other hand, such a plain as p.p. once existed, it is easy to understand how the rivers in old times flowed, from a low central watershed, to the north and south across *the top of the chalk*, at elevations at least as high as, and probably even higher than the present summit level of the Downs."

Compare this with the following statement, occurring a little later on (p. 23), and practically repeated in the closing paragraph,

"for the marine denudation had removed all the chalk except near the margin long before the rivers had begun simultaneously to scoop out the valleys of the interior, and cut the transverse valleys across the N. and S. Downs."

Then again we cannot understand how, except close to the shore where Ramsay speaks of reducing the land "to an average tidal level" (p. 370) "a great plain of marine denudation" could have been formed.

Then, if such a plain of chalk extended all over the Weald, granting that it might be slightly higher in the middle, as postulated, would not water (starting to run and to cut out *de novo* the features as we now find them) tend to collect in lakes or to run off in 'sheets,' and the rivers resulting could not then be rapid, as the gradients of such a plain would necessarily be slight, this would make it very difficult to understand how, in the way, the marked series of gaps in the N. and S. Downs could have been formed.

We must now refer to what seem serious objections to Professor Ramsay's theory, raised by no less a person than Professor Prestwich in his great paper in the Quarterly Journal of the Geol. Soc. (for May, 1891, vol.

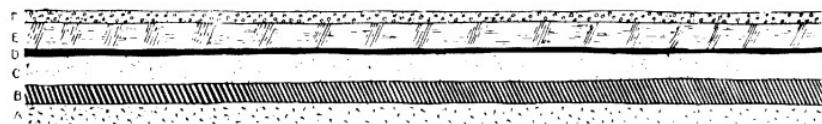


FIG. 1.

Diagram showing the horizontal deposition of the various beds as they existed before the elevation and denudation of the Weald.

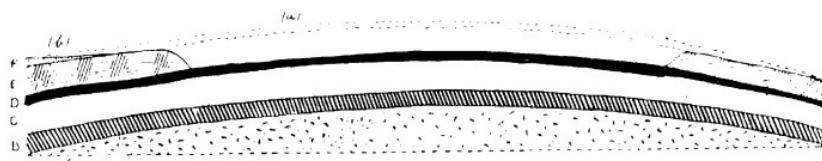


FIG. 2.

Diagram showing the curve after the elevation and removal of the chalk.

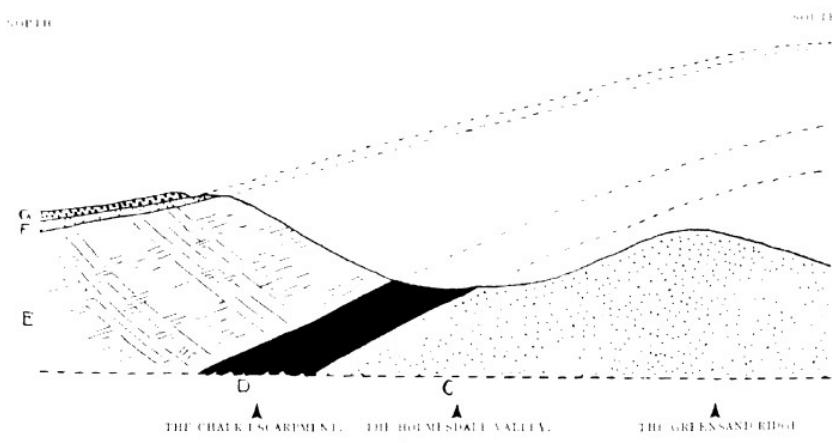


FIG. 3.

(The dotted lines indicate the unbroken land surface to the south before the excavation of the Holmsdale Valley.)

A—Hastings Bed. B—Wealden Clay. C—Lower Greensand. D—Gault. E—Tertiaries. F—Pineau Gravel. G—Chalk.

xlvii) on "The age, formation and drift-stages of the Darent-valley," contained in Section ii "on the Chalk Escarpment within the Darent District."

Referring to the more generally accepted hypothesis of the formation of the escarpment surrounding the Wealden area as due "to sub-aerial action and a slow retrocession of the outcropping edges of the chalk" he says (p. 157).

"It will, however I think, be found incompatible with the phenomena exhibited in this district. I formerly showed* that a large portion of the chalk covering the Wealden area was, in early Tertiary times, planed down and levelled by marine action, forming what Ramsay has termed 'a plain of marine denudation,' but I much doubt whether it affected more than a limited littoral area, and whether the chalk was removed from the whole of the more central area. It is certain that denudation extended beyond the N. Downs and probably to some distance to the south of the Lower Greensand area†. It is also certain, as I afterwards showed, that both the Tertiary Strata and the Chalk along the Northern boundary of the Weald underwent a similar erosion during early Pliocene times.‡ In neither instance, however, is there any proof that the denudation reached far into the Weald, but, on the contrary, the absence in the first period of Lower Greensand débris in the Tertiary strata, and in the second of Wealden débris, leads me to believe that much of the area remained almost untouched . . . Sir Andrew Ramsay felt the difficulty of the absence of sub-aerial waste for he observes:

"the absence of flints over nearly the whole of the wealden area, excepting near the Downs, is explained by this hypothesis, for the original marine denudation had removed all the chalk except near the margin long before the rivers had begun simultaneously to scoop out the valleys of the interior and to cut the transverse valleys across the N. and S. Downs."

"In the section referred to the chalk is shown to extend no further than the edge of the Lower Greensand escarpment, a distance of four miles from the Chalk Escarpment. But is not this limited range based on the very assumption of a fact which has to be proved ?

"Taking the range of the Chalk from Crossness in the centre of the Thames Valley, where its thickness is known, to the edge of the Chalk Escarpment at Otford, a distance of fourteen miles, we find it diminished from 650ft to 450ft, a total reduction of 200ft, or of $14\frac{1}{2}$ ft per mile.

"At this rate the Chalk should have extended 31 miles beyond the escarpment, or taking only the Chalk with Flints, some miles (16 ?) less. "Within this area, if the Chalk had been worn back by ordinary sub-aerial denudation agencies alone, we ought to find some evidences

* Q. J. Geol. Soc.: Vol. viii (1852) p. 256

† Q. J. Geol. Soc.: Vol. viii (1852) p. 256

‡ Q. J. Geol. Soc.: Vol. xiv (1858) p. 330

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"at the foot of the hills of the wreck of the chalk with its massive layers of flints, of the Pebble beds of the Tertiary strata, and of the beds of Red-Clay-with-Flints (both of which latter may have extended farther than the Chalk-with-Flints) in the manner represented by Ramsay, in fig. 70, p. 36, of his work above referred to; but there is no bed nor any talus of that description. Mr. Topley, however, is of opinion that 'we cannot expect to find any direct evidence that the escarpments have been formed and worn back by sub-aërial agencies,' but considers that the whole features are such as can be readily explained by sub-aërial denudation, whilst all other agencies are inadequate to account for the work done*. Nevertheless, if the hypothesis "is to be accepted, some such direct evidence ought to be forthcoming, "even if we assign a more restricted range southward to the Chalk, and "confine it to the limits assigned by Ramsay; or, at all events, the drift in the valleys within these limits should be in accordance with the hypothesis.

He then points out how the drifts do *not* prove this, and then concludes his paper thus :—

"Instead of a slow gradual recession, due only to atmospheric influences in the direction of the dip of the strata, the evidence rather shows that, after the first predisposing causes, glacial agency was the great motor in developing the valleys, and, as a consequence, the escarpment; and that the denudation was afterwards further carried on, in the same lines, by strong river-action and weathering—supplemented, at times, by renewed ice-action. It was, I conceive, by these more energetic agencies, aided by the influences of a heavy rainfall, and the issue of powerful springs on the face of the escarpment, that the escarpment was gradually pared back and brought into its present prominent relief. [Other observations in connection with the denudation of the Wealden area, and concerning the course of action of the rivers during its early stages, will be found in my paper. 'On the Southern Drift,' in Q. J. Geol. Soc., vol. xlvi, (1890), p. 166. *et seq.*]

We have, we fear, rather burdened the reader with lengthy quotations, but it seemed impossible to touch on the Denudation of the Weald without going somewhat fully into the difficulties of the problem.

We are certainly inclined to agree with Prof. Prestwich that ice-action may have played its part, as it seems almost impossible, seeing that the Boulder Clay is found in the Thames Valley not so very far away to the north of our area, that it could have escaped without coming within the influence of glacial conditions in a modified form, if only in the latest stages of the Glacial Period.

In our opinion, the various causes of the denudation of the Weald are still to be sought for, and the question may still be considered to be an open one. Especially do we think this to be the case when considering the point

* Mem. Geol. Survey, "Geology of the Weald," p. 300.

upon which nearly the whole of the question seems to turn, *viz.* :—how to account for the gaps cut in the Chalk Escarpment to the north and to the south, such as those now occupied by the Darent and the Medway, etc. We would rather look to causes operating at, and not far from the mouths of these gaps, and we would point out that in the case of the Medway, it seems remarkable that most of the drifts connected with it are to be found within its trumpet-mouth, as if a lake had once occupied that position.

Satisfying then, as has been for so long, the brilliant theory of marine, coupled with subaerial denudation, to account for the denudation of the Weald, the writer has a strong feeling that the problem is too complex to be referred to one such cause alone. It may be that the best way will be to study closely each valley separately, especially the Gaps, such as that of the Medway, and map the drifts within them. This the writer has attempted to do, and, in the case of the Medway, has met with such a paradox as this, *viz.*, two drifts in the middle of the Medway only a quarter of a mile apart and differing little in level, and yet quite different in composition and thus derivation, and yet these apparently were laid down before that Valley was cut out.

CHAPTER IV.

OF THE DEVELOPMENT OF FLINT IMPLEMENTS WITH SPECIAL REFERENCE TO THOSE OF THE IGHTHAM DISTRICT.

CONTRIBUTED BY

J. RUSSELL LARKBY.

DR. JOHNSON is reported to have said "all that is really known of the ancient state of Britain is contained in a few pages. We can know no more than what the old writers have told us." Since the days of Dr. Johnson, however, science has made progress, and new lights have arisen, until at the present time we do not seek for the earliest traces of man in the ancient tomb or in the ashes of the urn; we go to the hills and valleys and seek to work out the story of their connection with the race. The history of man, even as it is unreservedly accepted by all authorities, goes back far beyond the present order of things. It is intimately associated with a time when strange and immense animals wandered on the banks of ancient and often extinct rivers. The antiquity of man is a problem as full of difficulty as it is overflowing with interest; it has been as fully discussed as the great doctrine of evolution, and like that momentous question it is, in many of its phases, unsettled at the present day. On the mere matter of years, prehistoric archæology is silent, for it can only point to the *relative* ages of the various types of weapons and implements. To the oft repeated question, "What is the age of these flint implements?" no answer can be given, as it is clearly impossible to assign to a group of objects a place in historical antiquity, when these objects antedate the period of humanly commemorated events. And before we can settle the age of these implements we must first settle that of the beds containing them; we are thus faced by a problem within a problem.

Because stone implements are mentioned by some early writers it has been too often assumed that some plausible date may be given from such references. It should be clearly borne in mind that in some countries implements of stone were in use long after the introduction of metals; not for the sake of greater convenience, but on religious or superstitious ground. In the ancient practice of embalming the dead for example, the first incision for the withdrawal of certain organs was made with a flint knife, such as the exquisitely chipped specimens from Egypt now in the British Museum.

But it was probably with a view of preserving the continuity of an earlier use that a stone implement was used for the purpose ; and it was probably to observe a like continuity of idea that the operator fled before the people after the performance of his task.

The stone age exists in a greatly modified form even to our own day, for gun flints are still made at Brandon in Norfolk though the industry, owing to the more general use of up-to-date weapons in native races, is fast sinking into oblivion. It may also be of interest to remark that one of the Brandon flint knappers made some thousands of strike-a-lights for the use of the troops in the last Boer war.

References to stone implements in comparatively recent books of travel are by no means rare. In " Log Letters from the Challenger " Lord George Campbell records the use of stone hatchets by the natives at Humboldt's Bay, New Guinea, and knives of obsidian—a natural volcanic glass—by the Admiralty Islanders. Another instance in our own country is to be found at Chale, Isle of Wight, where the fishermen weight their nets with blocks of Lower-Greensand taken from the beach ; and these stones are " worked " for they are grooved in the middle to prevent the rope from slipping off.

It must, therefore, be borne in mind that the term " Stone age " is an expansive one, although the further we go back in time the more important is the part taken by the material, until we arrive at that remote age when it served as man's sole medium for offence and defence.

For convenience of study, it has been found necessary to adopt methods of classification of the various types and ages of implements, although here again the terms are understood to overlap, and have no claim to exactness. The most general classification is as follows, in descending order of time :—

1. **Eoliths** : *eos* = dawn, and *lithos* = stone. The beginning of the period of " worked " stones.*
2. **Palæolithic** : *palæos* = ancient. Early stone age.
3. **Mesolithic** : *mesos* = middle. An intermediate period connecting number two with
- + **Neolithic** : *neos* = new. Newer stone age.

Each of these periods may again be divided into early, middle and late divisions, and thus we find early, middle or late Palæoliths, according to the character of the work or the position of the implement with regard to the river gravel in which it occurs.

To enter at all fully into the details of one of these periods would be to demand the whole of the present volume, and we must, therefore, be content to draw attention to the more salient features of each group. In dealing with the earlier implements, it is necessary to impress on the readers the primal importance of practical work in the field ; without such experience a visit to any museum collection must lose much of its educational value, as in these institutions none but the highly finished examples are admitted.

* This also suggests a Lithic Period, when simply a suitable sharp stone was used, the pattern no doubt of the later worked stone.—F. J.B.

In thus viewing such collections, the mind forms an inadequate idea of the implements used for everyday purposes.

It is obvious that as we go back in time, the implements made and used by man will become ruder, and their worked or artificial character less apparent. It is probable that if we could trace the evidence of man to a period even more remote than that at present substantiated, we should find the tools then in use consisted merely of natural forms, unworked blocks of stone, such as fitted the hand or presented a good striking point or surface. In fact, the principle of evolution and the survival of the fittest type may be rigidly applied to the study of primitive man, as we hope to show in the following notes.

Before Mr. Harrison began his important and painstaking work, the implements of the valley gravel, *i.e.* of Palæolithic age, were generally regarded as the earliest evidence of man. At the same time, it is but fair to state that the need of an earlier type had long been felt by students of the question.* Now let us be quite clear as to the full scope of the statement quoted below. In the first place, what should be the characteristic features of a group of implements to enable us to claim it as belonging to a pre-Palæolithic age? If evolutionary principles are to be applied to the study, and they must be, then the obviously and definitely worked implements must have been preceded by one of a less obviously worked character, and it is conceivable that such an early type of implement might present the following characteristics:

1. The implements should be of an *archaic* character.
2. The types should be few in number as answering the few needs of those early people.
3. They should present something of the outlines seen in early Palæolithic implements.
4. They should be found under geological conditions which can be demonstrated as of extreme antiquity as far as the Drifts are concerned.
5. To substantiate all the above they must never be found accompanied by implements of Palæolithic age except in low-lying gravels where the early forms and indeed all other implements are present as derivatives.† The conditions necessary for the substantiation of this early type are seen to be stringent in the highest degree and we will now ascertain how far the Eolithic forms answer to such requirement.

Condition No. 1. The typical Eolith is that founded on a naturally split pebble, or nodule, or a piece of tabular flint with rude and irregular edge trimming; the chips are removed at a high angle to the plane surface and in most cases from one side only. Occasionally however there is alternate or reversed chipping, when after the first chipping the flint was turned over and chipped from the reverse side. The implements are often stained by

* . . . "It will, I think, be clear to the dispassionate observer, that we cannot regard these implements from the River Drift, however ancient they may be, as the earliest productions of the human race."—"Stone implements of Great Britain," Sir John Evans, p. 547, 1st edition.

† Indeed any implement may be considered to be older than the bed that contains it.

oxide of iron an ochreous brown, although this is not a necessary feature, the iron staining, as Mr. Bennett has pointed out, being evidence of the presence of iron oxide rather than implying antiquity.

Condition No. 2. That the types are few in number may be seen from any fairly typical series; generally they consist of:

1. Pointed forms.
2. Straight edged scrapers.
3. Concave and round-nosed scrapers.
4. Indefinite forms to which no actual purpose can be assigned.

Condition No. 3. It may be of interest as showing, that at a later time increased needs called forth increased appliances, if we compare the above with the types usually found in Palæolithic implements.

1. Pointed forms with sharp cutting edge and merging into:—
2. Ovate forms.
3. Knife-like forms.
4. Round-nosed scrapers.
5. Borers.
6. Choppers and pounders.
7. Picks.
8. Crescent or perch back forms.
9. Hammers.

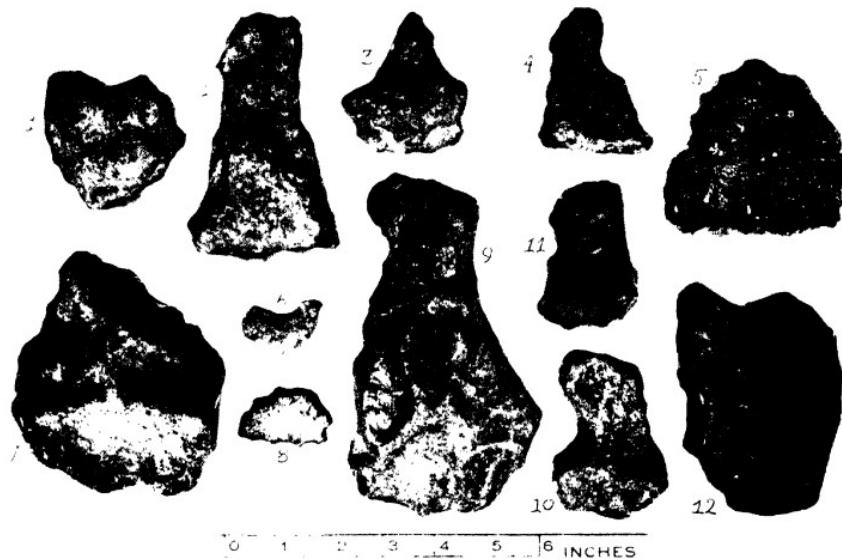
10. Indefinite forms to which no actual use can be assigned.

Condition No. 4. The geological position of these flints is all important as on a clear understanding of this evidence rests a proper appreciation of the antiquity assignable to the implements. It is therefore necessary to enter into the question in some detail. We have seen in the chapters dealing with the denudation of the Weald the original deposition of the various rocks was made under the sea. How long this piling up of material continued in uninterrupted sequence we do not know, but during and after the deposition of the tertiary sands and clays there came a period of final upheaval by which the area of the Weald was thrust up into the form of a dome of vast extent. As this elevated area came above the level of the sea it became subjected to marine erosion which may or may not have completed the removal of the chalk and tertiaries once covering the entire surface. The area thus uplifted and partly eroded would present something of the appearance shown in diagram B, Fig. 1. It is clear that if the area remained as a land surface the precipitated moisture in the forms of rain, ice or snow, would gather into channels and drain off the land. Owing to the configuration of the country the watershed would cause the streams to flow from north to south, or south to north, a condition of things of which we still find fragments at the present day. As these streams eroded their channels they would disinter the flints of the chalk and transport them to lower levels so that flints once resting in the chalk at *a* might, owing to this river action rest at *b* in a bed of river gravel. If, then, man existed in this country at this remote period, and used implements of stone, they might become incorporated in the gravels in the same manner as later implements rest in later and lower gravels.

Owing to the continued downward action of the rivers of the Weald alluded to, the Chalk was ultimately cut through, and the underlying Gault was reached. Here a difference would result in the course of the river, for owing to the soft nature of the Gault, the river would tend to throw out lateral streams running along the strike of the Gault. There would thus be as a result of this inequality of hardness the earlier consequent* streams flowing to north and south of the central axis of the Weald, with the later or obsequent drainage flowing from east to west, or west to east, according to the inclination of the land. This lateral denudation in the throwing out of streams along the strike of the gault accounts for the east to west Holmesdale, and we are thus brought to the striking conclusion that this tremendous trench is of a later period than the gravel capping the Downs at the Vigo, Terrys Lodge, and elsewhere. With this antiquity one must also associate that of man, for his implements are found, *in situ*, in the Terry's Lodge gravel. The evidence for the sequence of events as regards the Terrys Lodge gravel, and the Holmesdale valley is direct and interesting. Incorporated in the gravel of the former locality occur pieces of chert from the Lower Greensand, which by their worn edges show clear evidence of that water action which has also abraded the angles of the flints. We can only account for the occurrence of these greensand fragments by admitting them to belong to a period when there existed an unbroken land surface to the south, *i.e.*, before the excavation of the Holmesdale valley. With this striking evidence of age before us, it is hardly necessary to deal further with the question of antiquity.

Antiquity of position naturally leads to the question of the evidence of artificial working to be seen on the flints. This was a point long under discussion, and, in a sense, is not fully accepted at the present time. It is highly necessary to be quite clear as to the characteristic features presented by a worked flint. It is a remarkable fact that in Eolithic implements, the edges are frequently chipped into a series of small curves, each being the result of a blow of like intensity, if, therefore, we find a series of chips removed in a definite direction, at the same angle to the surface, and all from one side of the flint, it is pardonable to ask for a very close and sympathetic scrutiny on the score of intelligent design. When, moreover, these worked stones can be classified according to type, and when the types occur many times repeated, then the power of accumulative evidence asserts itself, and it may be safely urged that under these conditions we have evidence of design; and the balance of probability is in favour of man as the originator of that design. We have heard so much of the "natural agency" theory, that it would be interesting to see the production of the evidence. The challenge to the objectors to produce such undoubted natural forms was made years ago by Sir Joseph Prestwich, but up to the present it is unanswered; for clearly, if these Eolithic forms are merely natural, they should occur in all gravels, but to this proposition drift geology gives a very decided answer.

* "Consequent" because its flow was determined by or "consequent" on the uplift of the Weald; these streams are, therefore, of great antiquity.



Phenotypic

M. H. Fitch

EOLITHS IN THE MAIDSTONE MUSEUM (HARRISON COLLECTION)

BY PERMISSION OF THE MUSEUM AUTHORITY.

The writer once spent several hours on Hastings beach looking for such forms, but beyond a few indefinitely fractured pebbles, he saw no example which could be mistaken for an Eolithic implement. The tendency of running water is to produce pebbles and not definitely chipped flints of various types. Glacial action has also been invoked to account for these forms, and the term "glaciolith" was proposed for the supposed products of this extraordinary theory. The term obtained warm support—from its originator—and retired from the field after a transient and troubled existence. The theory, which up to the present day holds the field against all comers, is that of man.

Condition No. 5. Although we frequently find Eolithic forms associated with Palæolithic implements at low levels, so far as the writer's records go, no case has yet occurred where Palæolithic and Eolithic implements have been found associated in a high level drift.

The test of level is a crucial one to determine relative antiquity, for it is evident that the higher the land on which search is made, the older is likely to be the evidence found. The fact that in the sections exposed by Mr. Harrison on the Downs, and by Mr. F. J. Bennett and the writer at Cockerhurst, Shoreham, early forms alone were found gives the key for the relative antiquity of type. The evidence of surface finds is not so conclusive, though where the mineral conditions are well differentiated it is often possible to classify according to age. When we go to lower levels, the case is greatly altered, for there it is not unusual for Eoliths and Palæoliths to occur in association. For instance Eolithic implements much worn, occur in a low level Palæolithic gravel at Sepham Farm, just inside the trumpet mouth of the Darent; but the Eoliths are there as derivatives and simply bear evidence as to the break up of an earlier deposit. When higher ground is examined there later types tend to disappear, but the earlier persist in so regular manner as to leave little doubt as to the succession of events.

The objectors to the artificial nature of these forms have not so far formulated any definite arguments, but they seem to reserve their acceptance on two chief points :—

1. The abundance of implements found by investigators.
2. The apparent inutility of the implements.

So far as the first objection is concerned, it touches most nearly the man in the field; for by training the eye to look for evidence, it is remarkable how many worked flints of all kinds and ages can be found by one worker in the course of a few hours. Where an unmatured searcher would find nothing but a few flakes, the trained searcher might find dozens, much to the astonishment of his companion. The fact, therefore, that most of the acceptors of Eolithic forms are practical men in the field, may in some measure account for the abundance of the evidence produced. It is important to remember that the large number of Eoliths thus produced must represent a vast period of time, because since the days of their manufacture important changes have taken place in the configuration of the land; and that they are concentrated in certain limited areas. It seems strange to reject evidence because of its abundance; for following the argument we

The Story of Ightham.

ought to utterly reject Neolithic man, for his flakes and implements occur in extraordinary profusion in all chalk districts where systematic search has been carried out. Again it is possible to arrange some system of classification of Eolithic types into ruder and finer types, although our knowledge in this respect is not so full as might be desired. With additional workers in the field, resulting in observations over a wider field than hitherto, doubtless a more complete classification will be arrived at. Under any circumstances the evidence produced is deserving of careful attention, and a more sympathetic hearing than that hitherto accorded it.

The apparent inutility of the implements probably delays the general acceptance of the forms; yet the objection is not without its answer. Some of the heavier pointed implements might well have served as weapons of defence and offence whilst the concave forms might have served as scrapers to remove the fat from hides; in this latter case it may be suggested that the skin was passed over a pole, the curvature of which roughly fitted the concave part of the scraper. The straight-edged scrapers would certainly be useful in the manufacture of pointed sticks for weapons of war, as the writer has demonstrated by experiment. At the same time there are many forms to which no definite use can be assigned, but to refuse artificial origin to such forms because their use is at present unknown is a curious and dangerous argument. It reminds one of the Mohammedan's definition of literature "If it is not in the Koran it is untrue, and if it is in the Koran it is superfluous." But the apparently useless forms are not confined to Eolithic implements, for they occur alike in those of Palæolithic and Neolithic days.

The Eolithic stage of culture led up to the Palæolithic by a series of insensible changes which cannot be demonstrated in detail, but can be proved in general terms. The evidence for this transition of type does not exist in any clear form in the immediate vicinity of Ightham. In the coarse gravel of the Cray valley a type of worked flints occurs showing a kind of Eolithic working associated with a definite Palæolithic shape. These, however, are only mentioned incidentally, as the area in which they occur lies a little out of the scope of this volume.

The most important point to be referred to in Palæolithic implements is that without exception they are connected with present waterways though often with the early stages of such features, or in dry watercourses which can be regarded as Palæolithic. Nowhere as in the Eolithic series do we find Palæolithic implements occurring naturally in high watersheds and totally unconnected with present drainage systems. In some cases, as in the Medway, the Palæolithic gravel overlooks the still running water, and thus forms eloquent testimony for the former action of the river at a higher level, in addition to being evidence for the antiquity of the flints.

The configuration of the country during Palæolithic times differed from the present day surface features chiefly in the height of the land and the volume of the rivers although important coastal alterations have taken place in the North Sea and the Straits of Dover. The faunistic forms of Palæolithic times were also very different from the present day representatives although this point hardly concerns us here. The chief matter of interest lies in the



Photographic

[Mr. H. Elgar]

PALÆOLITHS IN THE MAIDSTONE MUSEUM (HARRISON COLLECTION)

BY PERMISSION OF THE MUSEUM AUTHORITY.

- No. 1. Fane Hill, Ightham. See Natural Science, vol. iv, p. 262, fig. 1.
 .. 2. Medway Gravel. Dunks Green.
 .. 3. .. Fane Hill, Ightham.
 .. 4. .. Bay Shaw, ..
 .. 5. .. Burley Valley, Ightham.
 .. 6. .. Bay Shaw, ..
 .. 7. .. Fane Hill, .. Level 375ft.
 .. 8. Hill Gravel. Seal Chart.

development of civilization as clearly shown by the types of his implements and the method of their manufacture. The types are illustrated in the Neolithic section, and from there it will be seen how complex, that is speaking in a relative sense, were his requirements when compared with the earlier people. Some of those early types such as the pointed and scraping forms survived with Palæolithic and later times and show us which forms were found to be most convenient by successive peoples. Of these the pointed form is most conspicuous, and this is easily explained because that form would serve a number of purposes, such as cutting, picking or digging, thrusting and scraping. But although the type remained in general outline, there were important differences in the manner of its production. In Eolithic days a naturally split slab with rough edge chipping sufficed : in Palæolithic days the pointed implements were well chipped, thickening in section towards the centre, thinning out quickly towards the base and less rapidly towards the point. In some cases these implements thin so rapidly towards the point, and have such thick bases that their use as wedges for woodsplitting has been well suggested. This again perhaps would suggest a knowledge of boat building. It is certain that the home of Palæolithic man was in many cases near the water and very little reflection would enable him to argue out the question that as he himself could float, it would be possible to make a contrivance to float and carry him as well. A floating log would of itself not improbably likewise suggest this. The waterways have ever been the highways of antiquity.

The impression conveyed by an inspection of a series of Palæolithic implements is that man in that stage had attained to a considerable degree of intelligence since he seems to have had special implements for special purposes. Thus the common use of the pointed implement was probably offence and defence; of the crescent shaped flints, cutting scraping or chopping, and of the long finger shaped type, picking and digging. The work on these implements is often of a high character bespeaking considerable proficiency in the art of flint knapping.

The sequence of Palæolithic implements although not definitely established, is at all events clearer than in the Eolithic series. The oldest types properly occur in the highest gravels and are often highly rolled or fractured ; these much rolled specimens are found in the Ightham area up to about 400 feet o.d. It is necessary to insist that these high level implements shall bear evidence of rolling, or answer in every respect to the condition of the containing gravel, as unrolled implements occurring at a higher level generally owe their elevated position to the agency of man. In these sporadic cases the mineral condition of the implement does not agree with the gravel on which it rests and its later date is therefore self-evident. In speaking of these high level "gravels" it must not be supposed that the deposit is of any economic value because these spreads are often of a thin and inconstant nature.

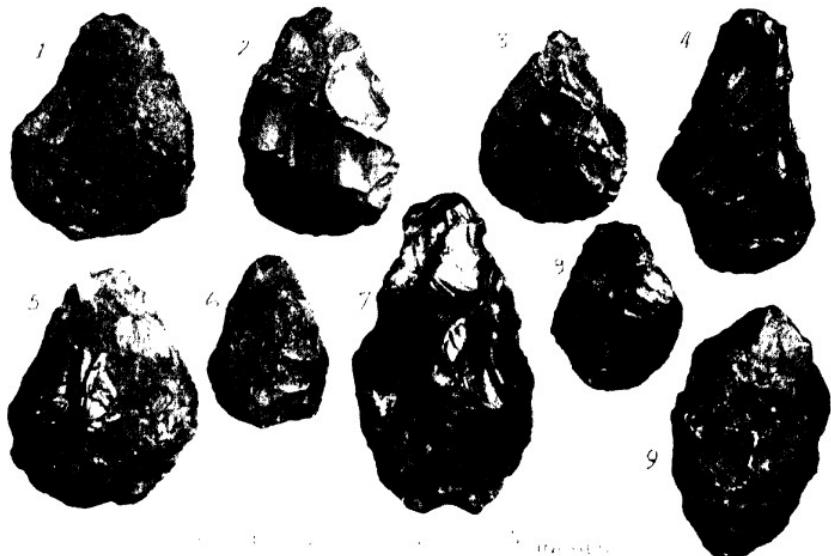
The sequence of French Palæolithic implements is based on a complicated classification, and in some respects the system there is not only a burden but is quite inapplicable in this country. It is possible to dis-

The Story of Ightham.

tinguish several types in England but here we can only briefly discuss the outlines. There exists in England a type of implements much resembling those found in some of the French caves, and as their types are also found here under similar conditions (see Oldbury) we can trace a parallel between the two countries. On the evidence given by a careful examination of the cave implements, it is possible to attempt a classification of many Palæoliths found on the surface. These and the implements found in the caves belong to a late stage in Palæolithic times; they consist of well struck flakes of considerable size, and implements of grand finish, which on broad grounds may be taken as evidence of later date. Some of the implements found by Mr. Harrison in the Oldbury rock-shelters show well enough the general facies of the type. These implements also seem to throw some light on the large flakes found in brick earths, lying on but not forming an integral part of the older river gravel. It is evident that the men of the rock-shelters were hunters—agriculture is a comparatively late introduction—because in these ancient dwellings have been found the implements of the chase, bone harpoons, javelin heads and fine tongue-shaped implements used probably for bone splitting; there also have been found the remains of the chase, and the memorials of the hunters in the form of engravings of the animals slaughtered. In these hunting occupations we may find an explanation of the large and well struck flakes found in the caves. For the purpose of skinning, a knife-like instrument was an obvious requirement, and in the absence of metal, a sharp freshly struck flake offered a solution of the difficulty. It is interesting to note that many of these flakes are dulled and chipped on the edge by use. The manufacture of bone needles and harpoons forms another feature in cave remains and shows that man even at this period was already passing out of the simple stone age. It is not a difficult task to scrape a small bone into a needle and bore the eye with a sharp flint point; it is not the manufacture of needles which so clearly proves the advance of man, but the manufacture of garments suggested by them.

We show here photographs of some implements of similar type to those found by Mr. Harrison in the excavation of the Rock-Shelters at Oldbury.

The next stage in the evolution of man's implements is very obscure. It was generally admitted until a few years ago that man was absent from this country for a long period following the close of Palæolithic days, owing to the severity of climatic conditions, and that when he appeared he did so endowed with the Neolithic culture. The opinion is now questioned and many investigators hold that a type of implement exists bearing evidence of Transition, this age being known as the Mesolithic period. The natural conditions under which such implements should be found to enable us to regard them as Mesolithic, are not by any means clear. There is, it is true, a series of implements and flakes found in low level brickearths which may belong to this period, but of course brickearths may be of any age although the lower the level of the deposit, the later its age. It is clear that these Mesolithic implements should retain a certain resemblance to the Palæolithic and in addition, those other features more fully adopted in Neolithic times.



Photographs.

"*M.*, *H.*, *F.*"

PALAEOLITHS IN THE MAIDSTONE MUSEUM (KARRISON COLLECTION)

BY PERMISSION OF THE MUSEUM AUTHORITIES

- | | | |
|--------|----------------|---|
| No. 1. | Medway Gravel. | Fane Hill, Ightham. |
| 2. | " | Highfield, Ightham. Level 3 (grit). |
| 3. | Bulley | See Preswich, Quarterly Journal Geological Society, vol. xlv, pl. 10, fig. 7. |
| 4. | Medway Gravel. | Fane Hill, Ightham. Level 3 (grit). |
| 5. | " | Highfield, Ightham. Level 2 (grit). |
| 6. | Ightham. | No details of the one. |
| 7. | Medway Gravel. | Fane Hill, Ightham. |
| 8. | Hill Gravel. | Chart Farm. |
| 9. | " | Stonepits Farm. |

Now a characteristic feature in Palæolithic implements is the sinuous edge when seen at the thinner aspect—a result due to alternate chipping from one edge. This feature is certainly seen in many "Mesoliths" and is significantly enough associated with forms confined almost exclusively to Neolithic days. In many instances these implements have undergone but little alteration of structure, although this may be due to the clayey nature of the material in which they are found. The writer has "Mesolithic" implements from the Darent brick-earths at Dunton Green where they occur near the surface of the ground. At the present time all that can be said with certainty, is that we find a class of implement showing features of both Palæolithic and Neolithic workmanship, but further evidence is necessary before any definite conclusions can be drawn from these apparently intermediate examples.

The evidence for Neolithic Implements occurs in profusion in nearly all areas where careful search has been carried out; indeed this very profusion of evidence constitutes a difficulty in the proper classification. By the number of forms indicating special purposes it is clear that man had arrived at a comparatively complex stage of culture. Thus, in contradistinction to the earlier types of Eolithic and Palæolithic implements, we have :—

- | | |
|---|---|
| 1. Arrows of several types. | 9. Chisels. |
| 2. Celts of several types, first
chipped, and then ground
and polished. | 10. Picks. |
| 3. Knives. | 11. Gouges. |
| 4. Strike-a-lights (scrapers). | 12. Adzes. |
| 5. Scrapers of several types. | 13. Axe-hammers of several types. |
| 6. Hammers. | 14. Pounders. |
| 7. Daggers. | 15. Choppers. |
| 8. Borers. | 16. Indefinite forms to which no
actual use can be assigned. |

This is an array of implements showing that man was clearly no longer compelled to live by the chase; for the occurrence of adze-like forms suggests boat-building, whilst to the large irregular picks an agricultural purpose has been assigned. As a constructor of houses, fortifications, tumuli and lake dwellings, Neolithic man has left to us manifold evidences of his versatility and industry. It must be granted that, in England, Neolithic man pursued his industries under more advantageous conditions than the earlier holders of the soil; for in his days the ancient and dangerous fauna had departed, and England had become separated from the Continent; this alteration in configuration preserved to him a certain immunity from outside attacks. At the same time there were certain drawbacks, for it also cut him off from the greater progress of the continental people; and this, doubtless, accounts for the almost complete absence of those magnificent weapons and implements found at various stations in the continent.

Perhaps the most interesting feature of Neolithic man's occupation of the land is the discovery of his old settlements. Although in many cases there may be no definite remains above ground, yet the abundance of flakes mark

the places where he chipped his implements, and, therefore, probably the site of camps. Such camps often occur on small isolated hills, and it is possible to recognize their defensive character in the days of hand-to-hand fighting.

As time advanced, experience in chipping enabled the worker to produce more finished implements, until the fullest development produced examples of the greatest delicacy. To a still later time belong the ground and polished implements, as these often agree in form with those of the bronze age, to which latter implements the Neolithic served as models ; we are thus able to connect the periods of stone and metal. It must be remembered, however, that although the ground and polished implements occur in Neolithic times, and at no earlier period, yet these highly-finished specimens are by no means the only characteristic of that age. On the other hand, many Neolithic implements are actually ruder than Palæolithic, a fact contributing largely to the difficulty in arriving at a satisfactory classification. It is clear that for the rougher purposes of everyday work, the roughest and most casually worked implements would be used ; it is by no means unlikely that the large and highly-finished types were the property of important men, and used for ceremonial purposes, answering in fact to the dress swords of later days.

A few photographs of these later implements are here given to illustrate the advanced character of the working seen in the finer Neolithic implements. However far they may be from the rude implements of Eolith, gravels yet that they are the products of the gradual change from that rude early type can hardly be denied.

The whole story told by these ancient stones is that of man's pre-eminence, they mark the turns and landings in the ascending stairs of progress, and a proper appreciation of their import has given to man an antiquity beside which the age of the temples of Egypt, or the civilization of Greece, are but as things of yesterday.

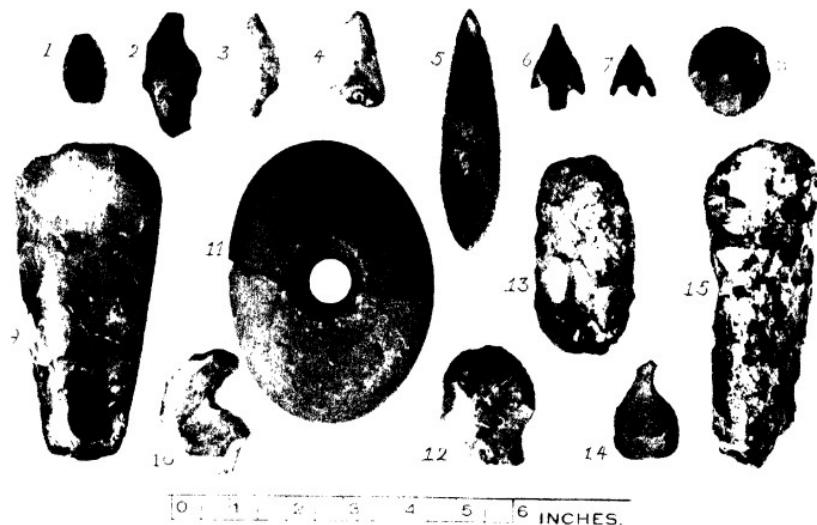
J. RUSSELL LARKBY.

REFLECTIONS AND CONCLUSIONS AFFORDED BY A STUDY OF THE VARIOUS PERIODS OF FLINT IMPLEMENTS.

As the Flint Implements are almost the only evidence of the existence of early Man it may be well to consider what may be deduced from them.

There is now a tendency to push further and further back the age of man and to become more and more liberal in accepting the evidence of his handicrafts.

It would also seem that the acceptance of an Eolithic Stage or Period should also carry with it a still earlier, say a Lithic one, when only *any*



[0] [1] [2] [3] [4] [5] [6] INCHES.

Photograph

Mrs. H. Edgar

NEOLITHS IN THE MUDSTONE MUSEUM (HARRISON COLLECTION).

(BY PERMISSION OF THE MUSEUM AUTHORITY).

- | | | | |
|---------------------------|----------------------------|------|-----|
| 1. Spear or Javelin Head. | From Oldbury. | | |
| 2. Buter or Awl | " | 12.5 | 8 |
| 3. Spear or Javelin Head, | " | " | " |
| 4. | " | " | " |
| 5. | " | " | " |
| 6. Arrow Head | " | " | " |
| 7. | " | " | " |
| 8. Round Scraper | " | | |
| 9. Polished ch. | " | | |
| 10. Hollow Scraper, | " | | |
| 11. Hammer, | " | | |
| 12. Round-edged Scraper, | " | | |
| 13. Rough Ch. | Not any particulars given. | | |
| 14. Buter or Awl | Oldbury. | 12.8 | 86. |
| | Celt | A-h. | " |

naturally sharpened stone was used, then to *select* the shape most adapted for the purpose needed, and after a time to attempt to renew the edge, culminating in the chipping out of a rude Implement based on the natural useful form.

If we grant all this, and it seems that we are not asking too much, we may also admit that early man must have advanced very slowly through all these stages ; call them by what name or names we like, Lithic, Eolithic, Palæolithic, all three, or only the last, it really does not matter.

The early part, then, of man's history must be lengthy beyond all comparison with the later, and our inheritance in the uncivilized part is far greater than in the civilized portion of it, and the more this is considered, the more light it throws on various obscure matters.

There must also be much difference of opinion as to the definition of man himself, as some will draw the line much lower, some much higher up ; it is, then, hopeless to expect any agreement on this point.

Eolithic Period. Admitting the best of these rude attempts at flint knapping, and here again the line of agreement is and must be a very blurred one, we find the forms very few and simple, and none that we can define as true weapons of defence or offence. Thus we may deduce that man's relations with his fellow men and with the animal world may then have been of an amicable nature.

He may then have made use of the animal-made tracks to water, etc., so necessary for man and beast, long before he thought of making any special tracks, the precursors of roads, for himself.

Palæolithic Period. Following man, now higher up in the scale, to the period of fully-admitted and well-defined Palæolithic Implements, we find that while most of these may be classed as tools, some, when mounted in long handles, such as the large pear and oval-shaped ones, would have furnished formidable weapons.

From these weapons, then, we may assume that man's relations, with the animal world at least, had become strained, and that he was in conflict with, and preyed upon it, for food and clothing, and thus had risen in the scale.

We notice again that these weapons are mostly of the cut-and-thrust and close-quarter type, though at the close of this period they may have had the sling and the throwing spear, and even a rude bow.

Man, perhaps, then had so much need to act in concert with man, to defend himself against the fierce beasts of that time that he probably was on good terms with his fellows.

Neolithic Period. Here from the great variety of the Implements, etc., as before remarked, man must have made great advances, and we also note that the weapons are of the long-range type, and the perfection of the shape of the arrowheads shows that he must have been a skilful archer. The population then had much increased, as the conditions of life were so much more favourable, and as property of various kinds multiplied, so would the desire to possess it, and to dispossess others arise, and man would then be tempted to war on man, especially as there was no need to act together against the then extinct fierce and gigantic beasts of the preceding period.

Prehistoric man's relations with the animal world, must in the earlier and even later stages of his existence, have been much closer than at the present day. Indeed, the more and more that machinery is used, the less and less need is there of animal help, so that even the term *horse-power* will soon no longer have any meaning or use.

Man was then dependent on the animal for food, clothing, transit, etc., and he must have learnt very much that was useful to him from the animal, and the animal would in a way learn from his contact with man, and the relations with each other must have been far more intimate than we can conceive of now. Man had from time to time to alter his modes of attack as the animal learnt to evade them, and it would appear that animals must have some means of communicating warnings, etc., to their offspring, for it is noteworthy, to mention one instance only, that the hook and line of 50 or 100 years ago only, would now be useless, being far too coarse to catch the fish of to-day.

We see that there was then certainly more than now, a distinct action and re-action of the man on the animal, and of the higher on the lower creation.

By the almost universal adoption of machinery we have, beside other losses, lost much of our touch with the animals, and this must have a far greater effect on our education, using this word in its widest sense, than we are perhaps aware of.

Machine-made Implements. Quite recently an attempt has been made to prove the natural origin of Eoliths from the action of torrents (see appendix) by producing from chalk Wash-mills, forms manufactured in these mills in the process of washing and breaking up the chalk by steam-driven harrows in a circular basin, where water is mixed with the chalk in which flints are embedded. The flints that are finally left are said to be identical with the typical Eoliths.

The comparison of fortuitous machine-made implements with the hand-made ones is not a happy one. There is little doubt that special machines could be devised that would copy typical implements of most kinds. Mr. Hazeldene Warren, F.G.S., a flint expert, has indeed quite recently made a machine to prove the *natural* origin by pressure and percussion, that occasionally turns out so-called Eoliths—and why does he stop there? Yet he claims the right to say what are successes and what failures, and yet as the *failures* are by far the more numerous surely they should decide the issue.

Through all this experiment runs the *human* element which seems fatal to the asserted *natural* origin of the flints in question, for with his own made machine Mr. Warren may be said to flake the implements he produces.

Again, can the results obtained by percussion always be distinguished from those obtained by pressure? The writer has seen very good bulbs produced by cart wheels and steam rollers. May not we define pressure as a long sustained blow, while percussion is a sudden one?

W. J. R. Longley

THE REMAINS OF A VOGUE SHIP AT THE END OF THE 18TH CENT.

PLATE 24



CHAPTER V.

THE ROCK SHELTERS OF LATE PALÆOLITHIC TIMES AT OLDBURY.

THE Oldbury Rock-Shelters are almost unique in the South of England. Others, of a similar age, are the well-known ones of Brixham and Kent's Cavern, Torquay, and those at Kirkdale, in Yorkshire. Those we are about to deal with are of the utmost interest to us, as they mark the starting point of our settlement.

We are now taking our readers back many many thousands of years, to a time when Britain had no separate existence, when it formed part of a vast continent.

Man was then surrounded, by a fierce and gigantic fauna, that of the Extinct Mammoth, Rhinoceros, Hippopotamus, Cave-lion, Tiger and Hyena—compared to which their present day representatives, which man, with his perfected weapons, still finds difficult and dangerous to subdue, are mere dwarfs. At what an enormous disadvantage then must the Palæolithic hunter have been placed, with his flints as his only weapons.

As to man's personal appearance at this early period we have the evidence afforded by skulls found abroad, especially in the caves at Cro-magnon. The picture is not a very flattering one perhaps, with the low receding forehead, projecting lower jaw, bent thigh bones and long arms, all showing great muscular strength. For all that, he seems to have had attainments of no mean character, as attested by the very spirited engravings, (cut with his flint graver), on the tusks of the mammoth, etc.; and, moreover, their absolute truth to nature shew what a close observer he must have been. Unfortunately, none of these have been found in our rock shelters. Still, the cave-type of implement, of which Mr. B. Harrison found some three hundred, shows that he could chip flint most skilfully.

Mr. J. Russell Larkby deals with the implements of this period on p. 33.

The shelters were once much more extensive, but the demand for the Oldbury or Ightham stone caused their demolition in the early part of the last century. Only two now remain, the one to the north, under the jutting crag, and the much larger one to the east, cut into the sand there hardened by the presence of oxide of iron.

We have given our readers some idea of the man, and must now pass on to say something about the animals of that far-off time.

A visit to the Natural History Museum at South Kensington, will show the skeletons of some of these monsters; and the immense tusks of the

The Story of Ightham.

elephant—some sixteen feet long—which can also be seen at the Maidstone Museum*, are good evidence of the size to which the Mammoth must have attained. From time to time accounts have been received as to the finding, in Siberia, of frozen, and thus perfectly preserved, carcases of the Mammoth and Rhinoceros. On the exposed parts of these bodies, wolves, foxes, etc., were seen to be feeding, and this has led to the discovery of the bodies. Quite recently a similar discovery has been made, and the body of a mammoth was brought back, skinned and stuffed, and is now to be seen in the Imperial Museum at St. Petersburg. This animal was found as he died, in the attitude of a last death struggle, trying to force his way out of the morass into which he had fallen; his tongue, perfectly preserved, was hanging out of his mouth, which was filled with unchewed grass. The chest cavity contained clotted blood, showing that a blood vessel must have been burst near the heart, in the desperate effort to extricate himself from the hole. His body was covered with long hair, a protection enabling him to endure the winter cold which the hairless elephant of the present day cannot do.

Any attempt to estimate the actual period in years when man lived, moved, and had his being in the Rock Shelters is quite impossible, but it will be seen that the physical changes alone demand a great lapse of time; such changes, for example as the cutting out of the Straits of Dover, and the deepening of the channels of some of our rivers by about 200 feet at least; to say nothing of the modification man himself has undergone.

Great as these physical changes must have been, yet, in a general way, the configuration of the district must have been much the same as now, *i.e.*, what is hill and dale now was hill and dale then, with the difference that a greater amount of country was then covered with water. Again, what is high ground now was much higher then, as also was the present lower ground. In fact, we may say that although in many respects the physical aspect of the country as we know it, is similar to that of Palæolithic time, the whole surface has been generally lowered, owing to the transporting power of running water—aided, perhaps, by ice and snow.

The now isolated patches of gravel, with no existing rivers to mark their origin, were then closely related to streams that have long left them high and dry. In the case of the larger streams, such as the Thames, Medway, and Darent, parts of these still occupy their former channels, the deserted ones existing as dry valleys, exhausted, owing to their capture by the larger existing rivers.

In Palæolithic times it may not have been impossible that Oldbury and the Rock Shelters were accessible by water, and that by it came the people who inhabited these earliest dwellings in this part of England; for early man's habitation and settlements, like those of to-day, have commonly been near water, so necessary for food, defence and communication—and, indeed, in the absence of roads, the waterways must have been *the* highways of those times.

* Found in Aylesford Gravel Pit.



Photographs

(Mr. H. Elgar)

IMPLEMENTS OF ROCK SHELTER TYPE IN THE MASTSTONE MUSEUM
(HARRISON COLLECTION).

BY PERMISSION OF THE MUSICAL AUTHORITY.

No. 1. From Syvant's Hop Garden

No. 6. From Kiln Field, Oldbury Farm.

No. 2. No particulars.

No. 7. No particulars.

No. 3. No

No. 8. From Sunny Banks, Level 350.

No. 4. No

No. 9. From Gibbet Field

The Rock Shelters at Oldbury.

41

The thick Forest of the Weald, later known as that of Anderida, blocked all access to the south ; the water communication afforded food of many kinds, and the commanding situation of Oldbury pointed to it as a most desirable place for a settlement.

Surrounded as these early settlers were by dangers from the fierce animals of that time, they must have been hardy indeed ; only the fittest could have survived the struggle for existence. They may, indeed, have lived, struggled and died in vain, as we have no certainty that they left any descendants to transmit the qualities gained by such a strenuous existence ; but perhaps it is to them we owe our love for sport, for hunting big game, and that hardness of nature so characteristic of northern people.

We must now let the curtain fall on our picture of Palaeolithic Man, to raise it again, perhaps, after the lapse of many thousands of years.

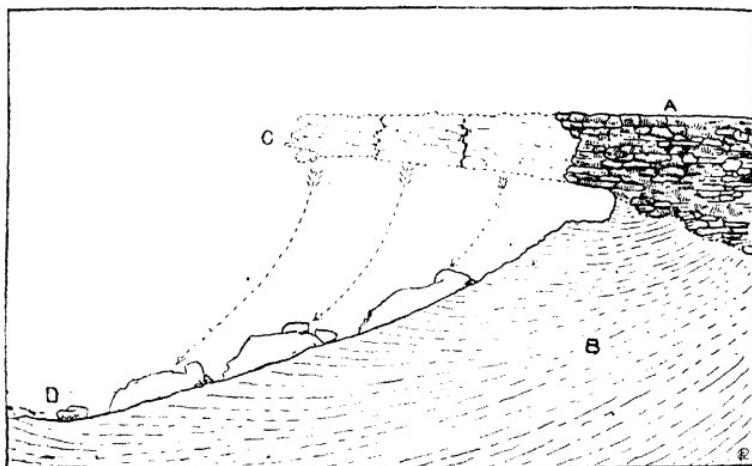


DIAGRAM SHOWING THE NATURAL WASTING OF THE ROCK SHELTERS
AT OLDBURY.

A—Hard Sandstone.

B—Soft Sand.

C—Former extension of roof of Rock Shelter.

D—Position of trenches in which Mr. Harrison found most of the implements.

CHAPTER VI.

THE NEOLITHIC PERIOD.

WE see man, in this period, under a very different environment ; climate, scenery, fauna, man himself, his tools, habitations and occupations, all have changed.

The geography and scenery, with certain modifications, were then very much as they are now—the coast line further out (allowing for the loss since then, perhaps at the present ten fathom line). This would make the Wash and the Bristol Channel dry land and the Isle of Wight part of the mainland.

The dense forest of the Wealden area, its retentive soil and undrained condition, must all have tended to produce a much damper and colder climate than now, so that man would seek for his habitation the outskirts of this forest ; the drier sandy soils of the Lower Greensand, and the well-drained steep slope of the chalk range.

Though some of the Palæolithic animals, such as the Reindeer and Ursus, lived on ; the fierce or gigantic Mammalia, (such as the Mammoth, Hippopotamus, Rhinoceros, Cave-lion, Tiger and Hyena,) had died out and their place had been taken mostly by a fauna similar to that which Cæsar might have found when he visited our shores. Man himself, too, was changed and came to this country not over the mainland but apparently by water, as the channel must, at least in the later part of the period, have been impassable on foot. He was short, dark-haired, with high forehead and a long skull. In appearance he was very similar to the Basques and Bretons of to-day and may be regarded as of the Iberian type.

The habitations and occupations of Neolithic man were different from those of his predecessor. He had ceased to be a mere hewer-out of caves, and a dweller under overhanging rocks such as the Rock Shelters, and though he did not build any conspicuous dwellings (and there may have been good reasons for this), he yet must have constructed over his dug-out pit-dwellings some kind of roof. We have not yet found any of the Denehole type of pits in our area, but certain hollows in the woods on the chalk plateau might turn out, on investigation, to be something of the kind, also he may have built rude wooden huts.

We shall give, later on, a description of the pit-dwellings at Rose Wood.

As to the occupations of man at this time they were far more varied, and show that he had certainly started on the road to a civilized state.

He no longer subsisted entirely by the chase, but had become a cultivator of the soil, and we have, in the face of the chalk escarpments, remains of

the "cultivation terraces," as at St. Clere, which may date back to that time, as they point to a kind of spade cultivation, that of the "digging stick"—the precursor of the plough, which could not have been employed on the high narrow ledges—not unlike the caschrom of the Highlander, (a kind of foot-plough).

Then he was a spinner and a weaver and grew the flax for his yarn. He made rude pottery.* He was a fisherman and navigated the waters in a wicker coracle or a dug-out canoe. He had, very probably, his beasts of burden, and was a trader and, no doubt, disposed of his wares by barter. So that, both in Summer and Winter, Neolithic man and woman lived a busy life, and one not far removed from that of the Britons at the time of the Roman invasion.

We must now look at the evidence that our area affords of the traces of Neolithic Man. His tools are scattered all over the surface, but are much more numerous round the Rose Wood Settlement, marked by the Pit Dwellings in Rose Wood, though this may merge into the Bronze Period, where arrowheads of five different types, also celts or chisels, and beautifully worked and drilled hammer-heads made from the hard Oldbury stone, and scrapers and abundance of other worked flints have been found by Mr. B. Harrison. (See the "Harrison Collection" at Maidstone Museum).

The Pit Dwellings at Rose Wood were explored by the Secretary of the Kent Archeological Society in 1871, and by Sir John Lubbock (now Lord Avebury) and Mr. B. Harrison. The Secretary of the Society, Canon Scott Robinson, states that Rose Wood is a rectangular coppice of about 15 acres and containing a series of "some 40 circular basin-like pits, symmetrically made and resembling inverted cones 5 to 10 feet deep and 15 feet in diameter. The soil is sandy (on the Folkestone Beds) and though the chalk is 2 or 3 miles distant, yet all round the pits flint flakes and implements abound." He suggests that there was here the workshop of the flint artificers in connection with the Oldbury Camp. Rude pottery, too, is found in these pits.

Though the results of the exploration seem somewhat scanty, yet we trust more may be found and, as we understand that the present owner is much interested, further research may be possible.

Mr. Harrison also considers that Foxbury (close to Rose Wood, and a spur of Raspit Hill,) was the site of a Neolithic Settlement.†

Many think—and we share these views—that there was a *gradual* passage from Palæolithic to Neolithic times,—shown better, perhaps, on the continent than here. Palæolithic man may have lived on here long unmolested and untouched by Neolithic man who would be a much later comer.

* See the Neolithic Bowl at Maidstone Museum, found while making the new tramway, June, 1904.

† To the Neolithic Period we may assign the vallum and fosse of Oldbury Camp, made after the water, that filled the valley at Crown Point and reached the foot of the Rock Shelters, had receded (see Chap. V), as after this *natural* defence had vanished an artificial one was needed.

The Story of Ightham.

COPPER AND BRONZE PERIOD.

As is well known the Stone Period merged gradually into the Metal Period, The earliest metal used was undoubtedly copper. This, when found in its natural state, could be easily recognised, and being malleable was easily hammered into shape. We seem to have had no copper stage in England.

An impenetrable mystery hangs over the invention of bronze. It marks a high stage in the progress of civilization, and it involves many problems that have yet to be solved. It may have been in use in the East long before it became known in the West, and the whole process of manufacture was, no doubt at first, confined to a few and kept a close secret. We may date this at least 5000 B.C. and perhaps a good deal earlier. It was probably introduced into this country by invaders, and may have become a native industry, but before it came into anything like general use, it was, no doubt, superseded by Iron.

In our area we have only a single bronze spear-head, found at Oldbury, connecting us with this Period.



Photograph:

KITS COTY HOUSE

Mr. H. Egerton



Photograph:

FALLEN CROMLECH IN ADDINGTON PARK

(Mr.

CHAPTER VII.

THE MEGALITHIC PERIOD.

WE must bear in mind, speaking broadly, that culture and civilization did not originate here, but have always been imported, and have travelled from the East to the West, and that each wave—either of conquest or of settlement—brought new forms of culture, which, in time, superseded those that the settlers or invaders found. But difference of material and innate artistic feeling, and a desire to originate and not slavishly copy, would often cause deviations from the imported ideas and models.

The Western Nations seem ever to have been more prone to change and innovation than the Eastern, though the East has been the cradle of thought and of invention. The Eastern mind must, at one time, have been very active and progressive, and then—having, as it seemed, attained perfection—growth stopped, and was stayed for centuries; though there are now signs of a desire to Westernize along certain lines. The East, too, had been the birthplace and home of philosophy and thought—each man there, to a far greater extent than here, is a philosopher—and this tends to simpler modes of life and aversion from change. Life on earth is short and cramping, eternity has no end and there expansion is unlimited—live then for the future and not for the present: such seems the dominant note of the East. The West has scant respect for eternity, the present is its chosen world—“let us eat and drink for to-morrow we die,” seems its guiding principle.

Now, Megalithic structures—those great stone monuments that so excite our wonder, and are such a puzzle as to their meaning and import—seem essentially to embody, in their size and mass, the idea of eternity, and so are characteristic of the East rather than of the West. What wonder then, that, looking at them, as we must, from the Western point of view, we find their meaning almost inscrutable; so that various and discordant theories are started to account for the stone circles, and also for the Dolmens that sometimes accompany them. Did these circles always have the Dolmen attached to them, or only occasionally? and was the Dolmen an afterthought and aftergrowth? Were they always religious, or secular first and religious afterwards? Such are some of the still unsolved questions.

These structures seem undoubtedly to have originated from the East, where rock-cut tombs and temples occur on so vast a scale, and they point back to a time when man adopted the natural cave as a dwelling. Afterwards, he may have improved on this, cutting out chambers after some definite plan; so that he began rather as a *hewer-out* than as a *builder*.

If we regard the early tomb as a copy of the cave-dwelling, we should be led up to the stately rock-cut Temple, where darkness and mystery seem the proper accompaniment of death and of the religious rites of a more advanced culture.

Our early churches show this. They are dark and cavernous, light being very sparingly admitted. In Nottingham we have an actual example of a rock-cut church of the XII Century. So that we may, perhaps, regard our Dolmens as attempts to reproduce the rock-cut tomb, and may, perhaps, consider them as introduced from a country where such structures prevailed. But we must always bear in mind that we have to deal with structures that have been, in many cases, wholly removed within the memory of man, and even where they exist have been very much mutilated, and we can never feel sure how much may be missing.

Now comes the question :—Were they *always* covered up with mounds of earth ? That they *sometimes* were seems undoubted, some still are,—and some mounds have actually been known to have been removed in modern times, for the sake of the soil, when agriculture began to make its great advance at the beginning of the 19th Century.

Perhaps the earliest forms may have been covered, and some remarkable mounds exist, as for example that at New Grange, in County Meath, which contains a chamber 20 feet high by 30 feet in circumference, and is approached by a narrow passage from the side of the mound, the entrance to which was closed by a large slab of stone. From this it would appear that, in some cases, the entrance was visible : so that there may have been a gradual passage from those wholly covered to those partially so (as in the case quoted) and from that to no covering at all.

In this we may see the supersession or modification of the eastern idea by that of the western. And, again, if the later forms were not covered, may not this have led to a "restoration" of the older forms by uncovering them, and thus bringing them into accordance with the later forms modified by western ideas ? It may also be that the mound-form may be typical of the tomb cut into the rock, especially where the entrance slab was exposed.

We must now see what examples we have, in our area, or just outside of it, of circles and dolmens, and then say something of their *possible* meaning (it seems impossible to do more than that) and their distribution. We have no complete circles, but have stones so arranged as to suggest circles or dolmens ; and these, moreover, are along a north and south line. Taking the furthest point to the north first, we have certain large stones at Yaldham that *may* be remains of Megalithic structures, and that is all we can say of them. South of this, on the slope at the foot of the Rock-Shelters, large blocks of the Oldbury stone were once very numerous. Mr. Harrison informs us that he thought he could see some disposition in these to form lines and avenues ; but very few now remain—too few, indeed, on which to form an opinion.* These structures, too, may have existed at Raspit and Oldbury Hill, but may have been removed for the sake of the stone in later times.

* See Brit. and Roman Period, p. 54.

J.W., T.L., Winet

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Photograph



South again, at Fairlawn Park, near the gamekeeper's house, are some large recumbent stones, and these may be the remains of circles. Many of these have been quite recently (and before our attention was called to them) removed and broken up, and they seem now too scattered to show any definite arrangement, though Mr. Harrison has endeavoured to make a plan.

But we have only to go a short distance out of our area, to Coldrum and Addington, to find three fallen dolmens, and attached to two of them are so-called circles, though one circle is more in the form of an oblong, completed by the Dolmen; and the other, at Addington, is a very long oval as far as its form can be made out. Of these, Coldrum is by far the most important, as being by comparison nearly perfect.*

These, like those already mentioned, range themselves along a north and south line, and the one at Coldrum is just one mile from the one at Addington. Five-and-three-quarter miles due east of Coldrum is the well-known Dolmen of Kit's Coty House, while south of this is the fallen one known as The Countless Stones. This corresponds very well with the fallen one just north of the one in Addington Park, which is about the same distance south of the Coldrum ones as The Countless Stones are from Kit's Coty House. At Horstead, the traditional burial place of Horsa—which again is north of Kit's Coty House—a Megalith, it is said, once stood.

We will now give a brief description of Coldrum Megalith, which is situated almost at the edge of a hill at the foot of the chalk escarpment. The opening faces the east and Kit's Coty House, (almost six miles away). At the foot of the hill runs, due north and south, an old deeply-cut road. To the west of the Dolmen, are a number of fallen stones lying in a shallow ditch round a slight mound with a diameter of some 50 feet and in the shape of a horse-shoe and converging to the Dolmen. Many of these stones must weigh several tons each. The slope, on which the Dolmen stands, was cut into some years ago for the sake of the chalk. This caused the fall of the capstone, leaving the two side and the back stones. The side and back stones are very regular slabs of Sarsen Stone about 8 feet high, 13 feet wide and 11 inches thick. On the slope of the hill lie several more stones. It is not at all clear what was the former position of these stones, or if they formed an approach to the Cromlech from the east.

Some years ago some explorations were made resulting in the discovery of a skeleton. Unfortunately these do not seem to have been done on a scientific plan, as the skeleton was handed over to the rector of Meopham, who buried it in his churchyard and nothing was either recorded or published, so that some very valuable information may have been lost.

From Coldrum Farm a footpath runs due south to Addington, and the first part of this, in a field, is marked out by five prostrate stones some little distance apart. The path also has the appearance of having been raised. Further along, the path runs through a wood and there six other stones some distance apart may be seen, one of these, as in the case of the former, being of considerable size. This path may have formed a "via sacra" connecting

* North of Coldrum, in Cockadamshaw, east of Harvel, are many sarsens (see Plan) suggesting a fallen chambered Megalith.

The Story of Ightham.

~~the Dolmen with Addington.~~ At the distance of about three-quarters-of-a-mile south of the Dolmen is a fallen Megalith, composed of several large stones very similar to The Countless Stones south of Kit's Coty House, and appearing to have been a chambered one, but there is nothing to indicate that it was either surrounded by a ditch or a circle, so that it differs in this way from Coldrum. Nothing has been recorded as to this megalith.

About a quarter-of-a-mile further south of this is the so-called circle in Addington Park. The road that runs through it was made many years ago. It is much to be regretted that nothing was recorded when the cutting of this road was made which passed through the slight ditch and mound. Careful observation would doubtless have revealed something of interest and perhaps of importance.

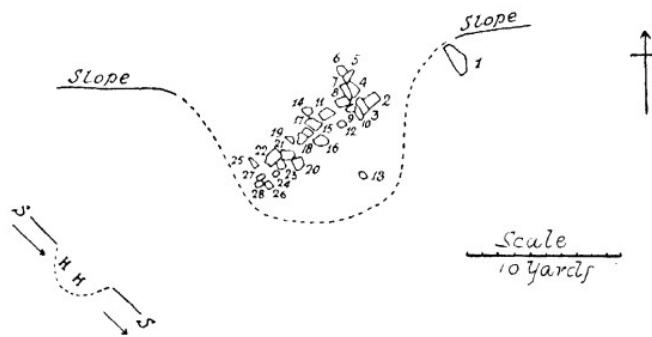
The Addington "circle" is in the form of a long oval (see Plan), but only some 22 stones can now be seen. Many of these are at wide distances apart. At the east end of this oval is the Dolmen. One of the stones—all of which are large and compare thus with Coldrum—leans slightly, but the rest, to the number of four, are lying flat. Some little distance, further east, are two more smaller stones close together, but their relation to the circle and Dolmen is not at all clear. The much better known Dolmen of Kit's Coty House stands as nearly as possible six miles due east of Coldrum and in full view of it, and we have evidence that its former condition was very different from its present one, for Mr. G. Payne, F.S.A., at p. 127 of his "Collectanea Cantiana" gives a letter from the Rev. W. E. Lukis, dated 7th May, 1883, stating that it was once "formerly in a mound," and that he had a letter written by one Hercules Ayleward to Dr. Stukeley, in 1723, from Mereworth Castle, Kent, describing the Upper and Lower Coty monuments as they existed at that time, together with sketches. Kit's Coty house is represented as being partly in a long barrow and the lower structure in ruins. He states that the former belonged to a Mr. John Taylor, "a lover of antiquity, who would not for 100 guineas part with as much of the stone as would serve to set in a ring." The latter was owned by Henry Beaumont and was pulled down by the previous owners, John French and John Frankham, about thirty years before. He describes its form and dimensions as given him by "someone who remembered it standing." Further North, at about 80 yards from Kit's Coty, he speaks of a long rude prostrate stone called "The General's Tombstone"; and further westward towards the summit of the hill, in a coney warren, "a parcel of small stones in the form of arcs of circles, and a double row of stones which he conjectures to be an avenue." So that we have evidence that in 1723, Kit's Coty House presented a very different appearance from its present one.

The long barrow and mound here mentioned may mean that these were to the west of the present Dolmen, and that all but the opening to the east—then, perhaps, covered with a slab—was covered by earth.

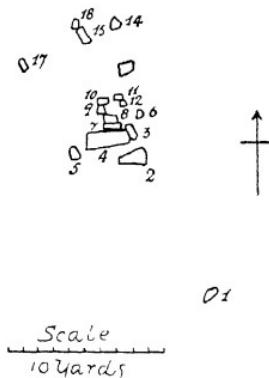
As before remarked, the Countless Stones, half-a-mile further south, corresponds very well to the fallen one, south of Coldrum.

Having given a description of the Megalithic structures within, and just

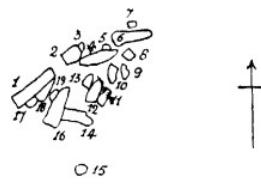
*Sketch Plan of Fallen Megalith at Cockadarnshaw
East of Harvel in a deep hollow H H on slopes S.*



*Sketch Plan of Fallen
Dolmen at Addington*



*Sketch Plan of
Countless Stones.*



From Sketch Plans

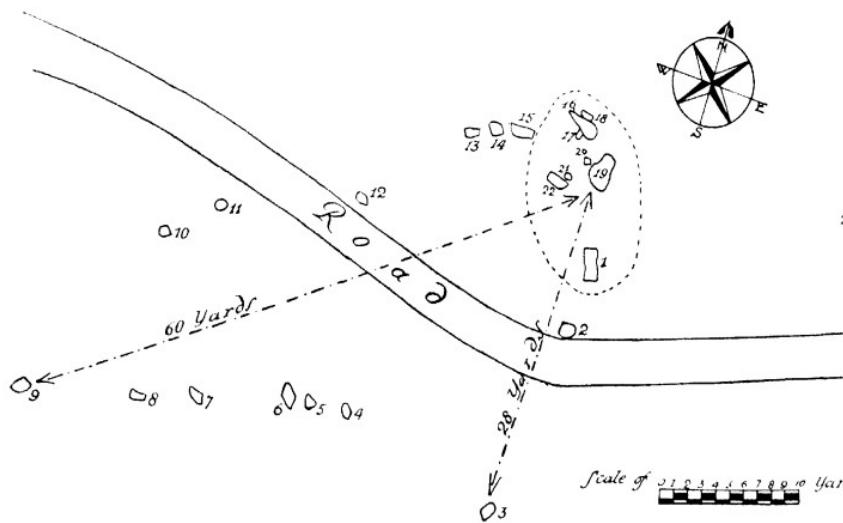
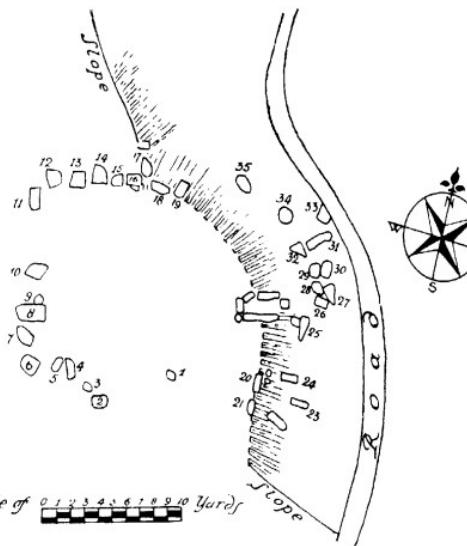
By the Author



SKETCH PLAN OF DOLMEN AND
STONE CIRCLE AT COLDRUM.

Nos. 22 to 24 are the displaced stones on
steep slope.

Nos. 17 to 21 are on the edge of the slope
(see page 47).



SKETCH PLAN OF STONE CIRCLE AT ADDINGTON (see page 48).

The Stones enclosed in the dotted line are those of the fallen Dolmen.

Measurements of the following stones in feet:

(13) 4' 8" X 4' 8"

(17) 4' 2" X 3' 6" X 8' 6"

(19) 6' 3"



without, our area, we must now consider their meaning, *i.e.*, whether they were secular or religious. May not they have been both, first perhaps, erected and used for secular purposes, and soon afterwards for both secular and religious uses.

Open-air parliaments exist to this day, and may date their existence to long past, perhaps to prehistoric times. It required a very long time for the superstitious prejudice against meetings within closed buildings to die away.* The earliest form of worship was, perhaps, that of the ancestor. To that, no doubt, succeeded nature-worship, that of water and fire, and the heavenly bodies representing these. Ancestor worship may first have been carried on at the Dolmens—the tombs, perhaps, of these ancestors. At these tombs, solemn vows would be made, chiefs elected and treaties ratified. In the case of nature-worship, the earliest form was, probably that of water, the first necessary of life. To water-worship we may, indeed, assign that fine Tumulus at Redwell, one mile south of Ightham church, which is not so striking an object now as formerly, when it was crowned with fir-trees. It is unfortunate that it has not been marked on the 6-inch Ordnance Map. Most of the *springs*, too, at its base, are termed "wells." It is true they are used as dip-wells, but surely they should have been so designated on the map. In addition to the springs are two most interesting "swallow-holes" close to the Tumulus. These may have introduced an element of mystery and have been an additional factor in determining the situation of the tumulus. On this tumulus also Mr. Harrison has found his best neolithic implements, arrowheads, etc., and, notably, an almost unique flint knife, regarded as a sacrificial one.

The worship of springs and wells, is not only most ancient but most persistent in many parts of England, to say nothing of other countries; and we still hear of "pin-wells," where pins, once valuable objects, are dropped; and of "rag-wells," where the bushes round them are hung with rags. The water from these holy wells† is still considered as a certain cure for bad eyes, and other complaints.

Turning to fire-worship, the fire was no doubt, in the first instance, lighted by the head of the family, who may have reserved to himself and the other male members the secret of its production. To the females was delegated the duty of keeping this family fire alight, and perhaps they incurred certain penalties if they failed to do so.

Fire then, in prehistoric times, when the climate was so much colder than now, and when it was so difficult to obtain with their rude appliances, would soon become an object of worship, and as the family assembled round it, in the morning and evening, they would probably join the head and author of it in some simple form of worship.

Later on, the worship of the blazing hearth, or family fire, was replaced by that of the sun. This worship may have then been transferred to the

* It will be remembered that Ethelbert received Augustine in the open air. This superstition that the saint might work some spell upon him if he received him within the house, illustrates a lingering of the old dislike against buildings.

† E.g., St. Edith's Well at Kemsing.

The Story of Ightham.

Dolmen, or family tomb, and this may have become a Sun Temple. We have noticed in each case these Dolmens face the east, as at Coldrum, Addington and Kit's Coty House.

Having thus briefly stated what we conjecture to be the meaning of these stones, *viz.*—that they had both a secular and a religious use, we will now consider the question of their position. This we have noticed is along a north and south line in the case of Coldrum and Addington, and also in the case of Horstead, Kit's Coty, and Countless Stones. North again of Coldrum are some thirty Sarsen stones, some of large size, in a hole in Cockadamshaw Wood, and half-a-mile north of Cobham Church the remains of another stone circle, a total of five megaliths along a north and south line. This fact at once called to our mind that we had noted many years ago that Avebury, Silbury and the stone circle south of it known as Little Stonehenge were along a north and south line, and were in each case one mile apart, as Coldrum is from Addington. This fact led us further to see if the Dolmens, or Kistvaens as they are termed on the map, west of Marlborough, also corresponded in position, and we found to our satisfaction that the two Kistvaens near the Devil's Den were both north of it, and that the last was just over two miles from the first.

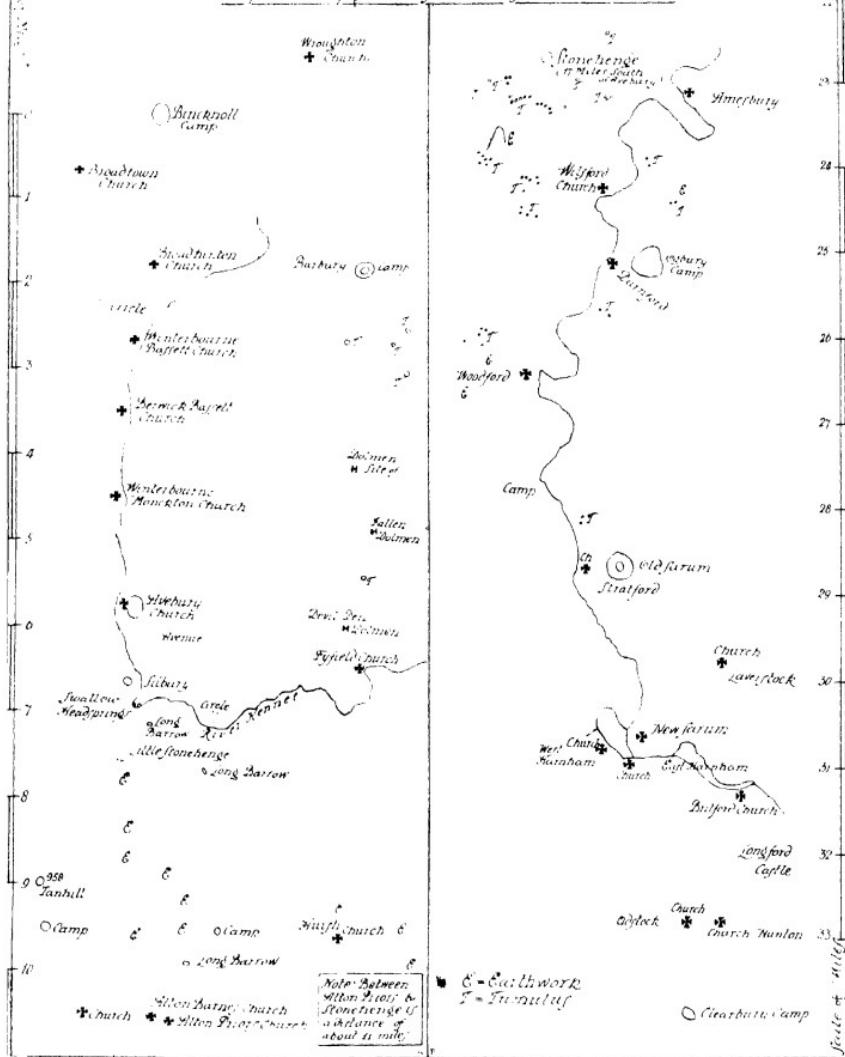
We next noted that there were four churches all north of Avebury and they were all one mile apart, and we afterwards found that this was the case also with many of the Kentish churches within and without our area (see plan).

We have alluded to the fact that many of these structures have been destroyed. One potent cause of this was the introduction of Christianity into Britain, for we find the Council of Nantes in the VII Century exhorting Bishops to dig up and remove all stones receiving worship, and Cnut also prohibited the barbarous worship of stones, trees and fountains, *i.e.*, springs and wells. But it was one thing to order and another to get that order carried out, and the opposition may have been so fierce and obstinate that a compromise may have been effected and many of the stone structures pulled down, but the stones used again in building the Christian churches on the sites of the Pagan temples. The introduction, too, of Christianity must also have been largely a compromise. We get some proof of this, for some of the churches at the foot of the Chalk Escarpment and north of it, *e.g.*, Meopham, Cobham and Trosley, have large sarsen stones either outside or inside their churchyards, or built into their walls or foundations.

This, then, may show a continuity of worship on the same site from the earliest times to the present. We understand that in Gaelic, "going to the stones" and "going to church" are synonymous terms.

We have stated our opinion that these Dolmens, in their later stage, were Sun Temples, and that fire was the representative of the sun. We will now quote from Dr. Phene's paper reprinted from the Journal of the Victoria Institute on "Prehistoric Traditions and Customs" in connection with "Sun and Serpent Worship," p. 29: where speaking of customs common to the Hebrew and Pagan nations, he says; "Fire was an Emblem of the Deity with both; the seven spirits of God were also represented, and the

Plan showing North & South position of Avebury, Silbury, Stonehenge & also of Camps, Churches &c.
Compare the position of Dolmens with Coloured Co.



From a Sketchy Plan.

By the Author

2-1532

Plan showing the North and South position of Megaliths &c.

Circle
Battle street



Rochester
Castle

* Luddesdown Church
& Sarsens at Farm

* Dunish
Church

* Cockadamshaw
Megalith

* Coldrum
Circles
or Via Sacra

* Circles
Addington
Church

* Offham
Church

scale of



Plan showing the relative position of Antiquities round Ightham.

N
0 0

* Stones
Yaldham

* Mounds
Court Lodge

Celtic
Pottery * Ightham
Church

1 1

2 2

Oldbury

* Redwell
Tumulus

* Rosewood
Pits

Old
Soar

Mote
House

Allen's
Farm

* Circles
Fairlawn Park

* Shipbourne
Church

3 3

4 4

5 5

Kits
Coty

Countless
Stones

Miles 7 7 Miles

Allington
Church

S

6 6

Castle
Tumulus

Castle
Tonbridge

branched candlestick was an Emblem. We are told, likewise, of the fire that was to be kept burning the whole night (*Lev. vi, 9*) *i.e., during* the time the sun was invisible, a specification quite distinct from that of its perpetual burning. On the Pagan side we find in all countries, including Britain, that not only was fire to be kept perpetually burning, but that in some cases it was to be each year miraculously renewed; the hearth fires were extinguished in Britain on one particular night, only to be re-kindled with the sacred fire given out by the priests, a custom still kept up in Jerusalem by means of lighting tapers, and still observed among the Guebras of India and Persia."

Dr. Phené also thought that he saw traces of a serpent and thus of serpent-worship, also connected with fire-worship, at Oldbury, in the sharply defined spur running out to the north of the Rock-Shelters, as he regarded the abrupt bluff terminating the spur as the head, and the sinuous ridge as constituting the body and tail of a serpent. The feature is striking enough and it seems to us entirely a natural one. But we have no opinion of any value to offer, never having studied the subject.

Before closing our notice of this period we would call attention to the plans of Coldrum and of Addington, and of something that struck us in connection with them. Subsequent research along these lines may not confirm this; still, as so little is known about these structures, these suggestions which we offer may be of interest and may lead to further research in that direction. The plan of Coldrum is that of an oblong, terminating at the east with what we would regard as the essentially sacred part, viz., the Dolmen; and at Addington we find the same thing. Now in the case of Coldrum it seemed very similar in plan to that of the Round Churches, while that of Addington seemed to challenge comparison with that of the Basilicas: and we consider that a glance at plans of Long Barrows will confirm the view we take of Addington.

CHAPTER VIII.

HISTORICAL IGHTHAM.

CONTRIBUTED BY

J. SCOTT TEMPLE.

(I). THE BRITISH AND ROMAN PERIODS.

THE first part of this volume has shown how Eolithic man gave place to Palæolithic, and the latter to Neolithic man. The Neolithic Iberians, called Kynesians by Herodotus, were overcome by and amalgamated with the Goidels or Gaels, who entered Britain from Europe somewhere about the tenth century B.C. About the third century B.C., a people came from Belgica called Brythons or Brittones, who were an offshoot from the Gauls. The Goidels and Brythons are collectively known as Kelts. The former introduced bronze into Britain, and the latter, iron. During the ascendancy of the Brythons, prehistoric Ightham may be said to have emerged into historic Ightham.

These Brythons dispossessed the Goidels, and drove many of them into the wilder parts of the country where Neolithic man still lingered. The idea that one race exterminated the other is exploded. If Julius Cæsar marched through the Ightham district he probably saw a few Iberian slaves, some Gauls, a number of Goidels, and a large number of Brythons. The term "Britons," the "Ancient Britons" of the school-books, applied collectively to this mixture of peoples, while not discriminating, is a convenient one to use. The Ightham district was important in British times, and on Oldbury Hill are the remains of one of the largest camps in the country. The Ordnance Survey gives the area of the camp as a little over 123 acres. The circumference of the intrenchments is two miles, 350 yards. From the fact that the intrenchments, consisting of a vallum and fosse, follow the natural contour of the hill we know that it was not a Roman camp as the Romans followed the rectangular principle in their fortifications. The sandstone rocks jutting out crag-like on the south side at the western end, on the north-west side, and on the east side at the southern part, formed a formidable natural defence and where this natural defence ceased, a vallum and fosse were made. On the slope to the north the vallum was made particularly strong, stones from the surface of the hill being used. A large number of these stones have since been carted away for road-metal. There

were probably four entrances, the principal one being at the north-east corner. The original deeply cut road which ascends into the camp at this point by the side of Mount Pleasant is still to be seen, though the public are now excluded from it.

On Hasted's map of Oldbury, 1793, it is very distinctly shown as a public road, together with the later path to the left with the steps cut in it. The lower part of this road has been interfered with by the digging of a sand pit, etc.

In the middle of the camp (now private property) there is a spring running northwards which supplied the occupants with water. Both Cæsar and Strabo describe British towns. The latter says they were woody fastnesses. He mentions their curvilinear shape, and tells how felled trees blocking up the approaches to the towns added to their defence. The sculptures on Trajan's Column at Rome bear testimony to the effective use the Britons made of timber work in addition to the vallum and fosse.

The burial-place for the dwellers in this oppidum was probably situated on what is now Ightham Common. Mr. B. Harrison records a tradition of stone cists having been discovered under the surface at that place. He says that there were many places of interment near the Seven Wents, but that they were broken up when the Common was trenched about the year 1857.

It is well known that the Britons kept large herds of cattle for tribal uses. Welsh traditions give us the names of many of the herdsmen who, owing to the position they held as guardians of the meat and milk supplies of the tribes, were men of great importance. The dwellers on Oldbury must have had some place in which they could keep their cattle safely, and prevent them from straying into the vast and dense forest of Anderida. What place more suitable for such a purpose than the low-lying ground just outside the ramparts, running from west to north, called Styants Bottom? Such a use for this place would extend through Roman times, and the use or tradition of such would be preserved by the Anglo-Saxons, either by continuing it as pannage for hogs, or by giving it a name in their language. "Styants" may be derived from the A.S., *stige*, a sty or place for cattle. "Bottom" is from the A.S., *bottom*, low-lying ground. Frankfield at the upper end of this valley is suggestive, for *franc* is Norman-French for pigsty, and *field* may mean in this case *fold*, an enclosure for sheep or other animals, derived from the A.S., *fald*. In the "Survey of the Bounds of Ightham Parish," taken on May 20th, 1763, the name "Oxpasture" occurs next to "Styant's land;" this is also suggestive. Here, also, is a pond with steps down to it, and in the bottom a Roman vessel was found, and querns in the bed of the stream near it. The land to the west and north of Oldbury seems to have been a favourite grazing ground until quite Norman times.

At one portion of the northern vallum of Oldbury some stones were found showing the evidence of fire, and adjacent to them was a quantity of charcoal, together with half a quern made of pebbly conglomerate. Several fragments of querns, used for grinding corn, made of this same conglomerate, have been picked up on various parts of the hill. Mr. Harrison has found on the surface of the ground several balls of flint, supposed to be grain-crushers for use in querns, as well as a number of flint scrapers, etc.

The Story of Ightham.

Three gold British coins were found on or near Oldbury in 1874, 1885, and 1902, respectively. They are uninscribed, but show the distorted survival of the horse-and-chariot pattern of the Macedonian and Gaulish coins. The 1874 and 1885 coins are referred to by Sir John Evans, in his "Coins of the Ancient Britons," (Supplement, 1890). He says, in reference to the 1902 coin, that it is much worn, but weighs $9\frac{1}{4}$ grains.

In Kiln-field, on the northern slope of the hill, a bronze spear-head and some pottery were found, and are now in the possession of Col. Bailey, of Ightham. Oldbury is mainly covered with chestnut and pine woods; the northern slopes being under cultivation for strawberry growing. The valleum at some parts has entirely disappeared, and the fosse has been greatly obliterated. When Leland visited the place, in the time of Henry VIII, the remains were considerable. Before it is too late the hill should be bought by the nation, if the county of Kent has not sufficient interest in it; systematic investigation should be made for relics, and everything done to preserve it.

Judging from the size of the camp it is not improbable that this was the residential place of one of the British princes or chiefs of Kent. We find that the princes of Cantium (Kent and Surrey) attacked the maritime camp, which the Romans had formed to protect their fleet, and were defeated, in 54 B.C., during Cæsar's second invasion. When Cæsar marched against Cassivelaun he may have used the road now known as the Pilgrim's Road.

The question arises—where did the Oldbury Kelts hold their councils, their religious festivals? No certain answer can be given, but it is curious that, until about sixty years ago, "roundabouts" used to be pitched in a field called roundabout-field on Oldbury. Here the children used to amuse themselves. There seems to be some suggestive reason for the "roundabouts" having been pitched at Oldbury instead of Ightham. May we not look upon that children's festival as a survival from Keltic times? The curious place-name "Double dance," occurs next to "Bare field" on the Rent Charge Roll of Ightham Parish of 1839. "Double dance" cannot now be located exactly, but "Bare field," also known as Bearfield, is within a stone's-throw of Roundabout field. Further; there is a tradition of stone circles having once existed somewhere on Oldbury. Mr. G. L. Gomme, in his book on Primitive Folk-Moots, says that circles of stones may be divided into several classes:

1, 2, for the purpose of "turning-rounds" and dances, and are those circles where the stones are placed uniformly at equal distance, and are not great in bulk. These include tumuli and dolmens.

3, assemblies and councils.

It seems not improbable that as Oldbury was the centre of Keltic social life, so that portion of it named Roundabout field, with the neighbouring Double dance and Bearfield, was the place where the assemblies were held, and where the religious festivals, in which sacred dances were a feature, were celebrated. The Roman occupation lasted for 500 years, and by the end of that time the Keltic festivals probably lost their sacred character, and the place would simply have become a centre of social amusement.

The Romans probably indulged in their favourite pastime of bear-baiting, in Bearfield, and, perhaps, collected numbers of those animals at this place, in order to export them to Italy, where they were turned out in the amphitheatres and "butchered to make a Roman holiday." Near the south wall of the Ightham graveyard, foundations of Roman buildings were found a number of years ago. Several hundreds of Roman coins were also found near the same spot previous to 1859. Pottery has been found in the churchyard, also in Churchfield, and west of Court Lodge; and pottery with coins in the fields called Maens or Mains Field, and Barnfield. Near Court Lodge a cinerary urn, about eight inches high, filled with burnt bone and ashes, was dug up. It had a Samian patera, stamped *divixi*, reversed over the mouth.

On the St. Clere estate, some land was broken up for the purpose of planting hops, when groups of pottery, equidistant, each deposit being accompanied by a glass lachrymatory, were discovered extending diagonally across the field from the south-east to the north-west corner. In Romney's Wood, on the same estate, near the large pond of Buckwell, there are many clay-holes, which may have been excavated by the Romans for making bricks and tiles. In the field adjoining the wood many fragments of tiles have been found. "Claypit field" occurs in the Rent Roll of 1839.

On a farm, belonging to a Mr. Biggs at Borough Green, some labourers came upon a cinerary deposit, about the year 1839. Several of the urns were taken home by an old man working on the spot, but as this act was followed by bad luck or ill-health he buried them in his garden. He regarded them as uncanny things, and the actual spot of their re-interment is unknown.

In 1899, the remains of a Romano-British cemetery were discovered at the clay and sand pit immediately north of Borough Green station. Many fragments of pottery were thrown away as being of no value, but owing to Mr. Harrison's intervention the destruction ceased in October, when Mr. George Payne visited the place, and made a descriptive list of the relics saved. (Arch. Cant., vol. xxiv) as follows:—

1. Cinerary urn of red-brown ware containing calcined bones. Height 12ins, diameter 8 *$\frac{1}{2}$* ins.
2. Ditto. Height 12ins, diameter 10 *$\frac{1}{2}$* ins.
3. Ditto. " " " 7 *$\frac{3}{4}$* ins.
4. Ditto. Much broken.
5. Patera of pseudo-Samian ware.
6. Ditto with leaf pattern.
- 7, 8, 9. Pateræ of ditto, plain and broken.
10. Vase of Upchurch ware, ornamented with the usual dot pattern. Height 6 *$\frac{1}{2}$* ins, diameter 5ins.
11. Ditto with square group of dots arranged diamond wise, and repeated six times round the body of the vessel. Height 4 *$\frac{1}{2}$* ins, diameter of bulge 3 *$\frac{1}{2}$* ins, mouth 2ins, base 1 *$\frac{1}{4}$* ins.
12. Vase of same ware, in fragments.
13. Ditto.
14. Cup of pseudo-Samian ware.
- 15, 16. Goblets of red ware, in fragments.

Fragments of cinerary urns with calcined bones, "evidently pre-Roman," were also found, and are now in Mr. Harrison's possession. The sepulchral deposits occurred in lines about six feet apart and two feet from the surface.

During the construction of the reservoir on Terry's Lodge Hill several small pot holes were found. In one of these were discovered a Neolithic celt, *burnt matter*, and fragments of Roman pottery including the rim of a mortarium.

In conclusion, it is only necessary to mention that considerable Roman remains have been discovered at Allen's Farm in the neighbouring district of Plaxtole, among them a beautiful bronze statuette of Minerva.

(II). THE ANGLO-SAXON PERIOD.

No remains of the Anglo-Saxon period have been discovered in the parish, and the only evidence we have of such is that revealed by the place-names. Mr. B. Harrison has supplied me with a list of more than 300 place-names of the parish, and nearly all of them are Anglo-Saxon in derivation.

Strictly speaking, to use an Irishism, the Anglo-Saxons who first settled in this district were Jutes.

The origin of the name of the parish itself, "Ightham,"* has not been definitely settled. Some suppose that it is derived from the eight principal hamlets situated within the boundaries; from the A.S., *eatha*, eight, and *ham*, a home. The eight "hams" are said to be Ightham, St. Clere, Oldbury, Borough Green, Ivy Hatch, Bewley, Redwell, and the Mote. Besides these there are the settlements on Ightham Common; round the "Cob Tree," which, though a modern public-house, is erected on the site of an earlier structure; at Petham; and at Fen Pond which is partly in Wrotham parish. "Bewley" and "Mote" are Norman-French, and "Ivy Hatch" is probably the same. If this is the true derivation, then Ightham Village must have taken its name from the general name of the parish,—a most unlikely thing. Others have suggested a derivation from the *eyot*, or small island on which the Mote is built, but this also does not seem satisfactory.

The Jutes landed in Kent in A.D. 449, and when they came to this neighbourhood their first homestead was probably established near the stream of the Shode, and on the high ground where the Church and Court Lodge now stand. There is little doubt that the Shode was much larger then than it is now, and the place-names "Herring-shaw," i.e. Heron-shaw, and Bayshaw, seem to point to a lake on the course of that stream by the side of which herons nested. Hence we may not unreasonably look to the A.S.

* Note. It has been spelled at various dates as follows:—1254, Hightham; 1293, Eytheham; 1307, Eightham; 1313, Eghtham; 1374, Eygtham; 1552, Itam; 1588, Itham; 1596, Ightam; 1619, Eightham; 1619, Ightam; 1639, Itcham; 1645, Igham; 1692, Igtham; 1776, Eightam; 1869, Ightham. In *Textus Roffensis* it is spelled Ehtcham. I have noticed it spelled somewhere as Eyotheam.

root *ea* or *ey*, meaning *water*, as supplying a derivation for "Ightham," or "Eightham." The whole parish abounds with springs;* modern drainage and the cultivation of centuries have however made a considerable difference.

The Jutes must have seen very considerable evidences of Keltic occupation on Oldbury Hill (1659, Oldborough. 1849, Old Berry), and for that reason they named it *Eald-byrig*, or the Old Burgh, from *eald*, old, and *byrig*, a fortified place.

They probably saw evidences of Roman and British habitations at St. Clere, at which place tile-making had been carried on, and through which the important "Pilgrim's Road" passes, and consequently it became known as Aldham, (1191, Aldham; 1293, Eldeham; 1340, Yeldham; 1570, Aldame; 1659, Yaldham); or the Old Home.

There being an important Romano-British cemetery at Borough Green (1554, Burrow Green; 1776, Barrow Green;) it was accordingly named the Burying Green, or the Barrow Green, from the A.S. *byrgan*, to bury, *beorh*, *beorgan*, to protect, and *grene*, green or grass.

The small hamlet of Redwell was so called because its waters, impregnated with oxide of iron, have a red tinge; from the A.S. *reād*, red, and *wæl*, a spring or pool.

The derivation of "Ivy Hatch" (1657, Heavy Hatch; 1659, Ivie Hatch; 1776, Ive Hatch) is somewhat obscure. Isaac Taylor says that names ending in *hatch* often indicate the ancient boundaries of forests. "They are derived from the *hitch-gates* which kept cattle from straying out of the forest." *Hatch* and *hitch* are derived from the A.S. *haca*, the bar of a door, a gate, or entrance. The name, in all probability, simply means *Ivo's Entrance*, for the hamlet stands on the top of the hill overlooking the Mote. It stands immediately at the top of the road which *enters* into the wooded gorge at the bottom of which the Mote, originally the dwelling of *Ivo de Haut*, is situated. Or it may possibly be that the hamlet once referred to as *Ivo Haut's*, by a very easy change became known as *Ivy Hatch*; and the fact that it was the entrance, or hatch, into *Ivo's* land, would help in this change. *Ivy Hatch* also marked one of the entrances into the forest of Anderida.

It has been supposed by many that the Mote (1374, La Mote; 1575, Mote; 1659, Moat;) derives its name from the Witenagemote, or assembly of elders, who held their deliberations at this place before the Mote was built. Major-Gen. C. E. Luard, in his paper on the Mote says: "the surrounding of a place of importance with a moat was a common enough circumstance in those times of insecurity, and quite an insufficient cause for nomenclature." Its situation also at the extreme end of the Ightham district does not tend to favour such a supposition. Mr. Harrison has

* Note. The following place-names prove that such was the case:—Buckwell, Redwell, Tricewell, Shadwell, Bates' well, Bennetts' Old well, Moor well, Swan pond field, Fen pond, Hither Martin's Spring field, Water-flash pond, Petham old spring, Osier bed, Rushy mead, Well field (the Mote) the Mote stream, Fen meadow, Busty or Buster (local name of the Shode) Herring Shaw, Bay Shaw, the Fish ponds (at one time a swamp, but drained into five ponds after 1819). Besides these there are a number of wells and springs unnamed.

supplied me with what I take to be a clue to the identification of the true place of the local assembly.

There is a field on the Court Lodge estate, and not far from the mansion itself, called Coney* or Cunny Field. On the Rent Roll of 1839 it is named "Cunney Field." Mr. Harrison tells me that he has seen the word *King* used in connection with this field, and this is suggestive. The probabilities are that the name merely means "rabbit field." It is possible that the name *Cunney* is derived from the A.S. *cunnan*, to know (how to do a thing).

Curiously enough, the name, "Thong Mead"† occurs on the Rent Roll of 1839, on the same estate. Thong is derived from *thing*, meaning a local *thing* or assembly, and the root meaning is a *law-suit*. Near Cunny field we also find "Homefield."

Isaac Taylor says that such assemblies are held at conspicuous places, such as hills, ridges, dykes, fords, bridges, ancient trees, monoliths, preaching crosses, *posts*, or barrows. Adjoining Toll, and near Cunny field, we find "Post field." The Mote, by the way, is only conspicuous by its absence from the vision of any person who happens to be walking in the neighbourhood, so secluded is it. On the other hand, the land round Court Lodge is on a ridge and conspicuous. By standing on Mount Pleasant, and looking over the valley, one can easily see the convenient position the Court Lodge has relative to most of the chief points of the parish, *viz.*, Ightham, Borough Green, Oldbury, "Cob Tree" district, Bewley, Redwell, and St. Clere.

Another fact, throwing light on the subject, is, that the Norman *Court of the Manor* is, (together with the *Court Baron*, and *Court Leet*) derived from the Anglo-Saxon assembly. The Court of the Manor of Ightham was held at Court Lodge (built on the site of an older structure), and, therefore, in the same locality as the older Witenagemote. Important evidence is afforded us in this direction by the moated mounds immediately to the north of Court Lodge. (See British and Roman Periods).

These consist of two large mounds, one of which is surrounded by a moat filled with water, and the other by a dry ditch. Until excavations have been made it is impossible to definitely say that they belong to this or that age. Their position, however, relative to Court Lodge, and the fields whose names I have just mentioned, is very significant. Close to the mounds there is a pond, roughly square in shape. Mr. Harrison has suggested that Ightham takes its name from these mounds, and means the *Eyotham*, (*Eyot*, a small island).

Though the Manor Court was held in Court Lodge at one time, it was not always so. The early courts were held in the open air in order to avoid the influence of evil spirits.

The origin of parishes is involved in much obscurity. The ecclesiasti-

* To be compared with Conygree Hill, Glouc., which lies near the Church, and has signs of a trench; Conyag Hill, Aberdeenshire, near a tumulus; Connyhead, now called Spurn-head, Yorks; also with Cunny, Coningsby, Coneyby, Conington, Cunningham, Kingthorpe, Kinsby, etc.

† Note.—To be compared with Thong, in Kent; Tong, in Shropshire, Yorks, and Lancs; Thingwall in Lancs; and Tynwald Hill, in the Isle of Man.

cal divisions were not coterminous with manor estates, and as an example of this fact the estates of the old manor of Aldham St. Clere lie partly in Wrotham parish and partly in Ightham. Though the areas of most parishes were roughly settled in late Anglo-Saxon times, many did not have their bounds determined till a hundred years after the Norman Conquest. When or how the boundaries of Ightham parish were determined we do not exactly know.

In a communication to the *South Eastern Gazette*, several years ago, Mr. Harrison wrote of Ightham: "It (the parish) is narrow and long, running north and south. It would seem as if in the original plotting-out of the parish a bit of the Wealden Clay (and forest) was deemed necessary for pannage for the hogs; the higher and dryer land on the green sand escarpment (on which, as a rule, the original Keltic home was situate), and the gault-clay for pasture. The crest of the chalk escarpment was for dry pasture, and afforded an extensive outlook. This goes as far as the ridge-road, which forms the dividing line; other parishes on the chalk plateau running as far as this old road. In some places the road is disused, or used only as a footpath. Topley's Memoir shows that the old track-way determined the boundaries."

The length of the parish from north to south is about four-and-a-half miles, and the width from east to west at its widest part, about two.

(III). THE NORMAN AND PLANTAGENET PERIODS.

IGHTHAM is not mentioned in Domesday Book, though the hundred of Wrotham in which it stands is referred to as "Broteham."

The small hamlet of Bewley (1659, Beaulies) derives its name from the Norman-French, *beau-lieu*, perhaps on account of its excellent position on high ground overlooking the Shode Valley.

When William I settled in England, in 1066, he divided the country among his followers. The estates so divided were called *manors*, from the French, *manoir*, derived from the Latin, *manere*, to stay. The Anglo-Saxons who had to toil on the land under their new Norman masters, must have felt that "mane" was a very appropriate name, since their masters soon convinced them that they really intended to stay.

Ightham parish was divided into the three manors of Ightham (q.v.) Auldham St. Clere (q.v.) and the Mote (q.v.). On all manors (with few exceptions) there was an extent of "waste" land, on which the free tenants of the lord of the manor, and his villeins (serfs or slaves attached to the soil) had their rights in common. Ightham Common was the original common land of the manor of Ightham. There was a good deal of unenclosed common land besides Ightham Common, but where the "Enclosures Acts" were abused private persons often became owners of public property.

In Norman times there was a park at Aldham St. Clere well stocked with deer. It was known as Ightham Park, but was disforested before 1596.

In the Rent Roll of 1839 there occurs a clue to its locality in the name "Park Hall field." Probably at this place was the dwelling (A. S. *hall, sall*), of the warden or keeper of the park. We have also Buckwell field at St. Clere. Isaac Taylor says that names like Buckley, Buckhurst, etc., may be referred to the A. S. *buc*, a stag or buck.

In the record of the holders of knight's fees in Kent, in the 38th year of Henry III, we read: " Hundredum de Wrotham, Villate in eodem—Wrotham, Eltham, Santstede & Sybourne."

In the 39th year of Henry III, 1254-5, there happened an affray at Ightham, of which the following is an account:—" Nicholas Cok and Galfrid his companion, unknown malefactors, came in the early darkness of the night to the house of Robert le Percher, and carried off linen cloths and other garments from the house through a certain window. And upon this came John Tassel and several others of Hightham who kept the night watches in the same town, and when the aforesaid malefactors perceived the said John and others coming towards them they made off with the stolen garments: and the said John and others raised the hue on them: and the said John in the pursuit met the aforesaid Galfrid carrying a certain axe-pike and would have arrested him, but the said Galfrid in defending himself tried to strike the aforesaid John with the said axe on the head. The said John warded off the blow with a certain staff, and striking him back with the staff hit Galfrid." From the fact that the Plea Rolls do not record what the said Galfrid said when the said John hit him, I suspect that what he did say was judged unfit for publication.

In the Plea Rolls of the 21st year of Edward I, 1293, occurs the following accusation of robbery:—" William, called atte More, of the borough of Eytham, for a certain cow stolen from Simon, clerk of Syburn. And all withdrew themselves, and are suspected; therefore let them be demanded and outlawed. The chattels of the aforesaid William atte More are worth eighteen pence, for which the Sheriff shall answer. And he was in the pledge of Geoffrey the son of Alice, in Eystheham; therefore in mercy."

" More" is either the place now called the Moor, at Ivy Hatch, or else Moor Well near Ightham Knoll.

" In mercy" signified that a person had committed an offence against the law for which he stood at the mercy of the King or his representatives.

On the Jury Roll of Wrotham Hundred, in the 6th year of Edward II, 1313, we find: " Nicholas atte Ffen . . . sworn." " Ffen" is the small homestead now called Fen Pond. He was one of the jurymen who sat on the following cases.

" Henry le Bresiere, who used to lodge at the house of Robert le Berker, in the borough of Eghtham, came to the house of the said Robert, and having found Matilda, the wife of the same Robert, by herself in the house, he instantly killed her, and took off the goods and chattels of the same Robert, and at once took flight, and is suspected. Therefore let him be demanded and outlawed. His chattels are worth twopence halfpenny, for which the Sheriff shall answer. The first finder and four neighbours are

deceased. No Englecherie presented. Judgment: *murdum* on the hundred. And whereas this happened by day, and the ville of Eghtham did not take him; therefore in mercy."

As the Justices Itinerant made their circuits every seven years there was plenty of time for "the first finder" of the body "and four neighbours" to die before the case was brought to trial. "Englecherie" meant that a person was born of English, *i.e.*, Anglo-Saxon parentage. If an Englishman killed an Englishman, and made his escape, the hundred in which the murder was committed was fined a certain sum. If an Englishman killed a Norman, and made his escape, the hundred was made to pay a heavier sum in consequence. In order to avoid paying this heavier fine the hundred would try to prove that the murdered person was English, and this proof was called Englecherie. In this year, 1313, Englecherie was more or less a dead letter, because the Normans and English had so much intermingled. The term long survived the practice. The term "murdum" was applied both to the offence, and to the pecuniary penalty imposed on the hundred for its commission. The next case was that of an attack by several malefactors on the house and person of "Robert Cok' of Stanstede And the boroughs of Stanstede and Eghtham did not come in full to the inquest held before the coroner; therefore in mercy."

Next we read that several persons from various hundreds, "and John the son of John Rad, of Eghtham, together with other malefactors unknown, came by night to the house of John de Wulford, in the borough of La Hale, and killed the same John Wulford, and a certain Simon Cody, who was in the same house, and immediately took to flight. They are suspected; therefore let them be demanded and outlawed. They had no chattels, neither were they in a pledge, because they are strangers"

Further we read: "The jurors made presentment that Robert, the son of Geoffrey Aliz, of the borough of Eghtham, and William Readhod, of Hertleg'h, stole a heifer which belonged to Thomas Ffaber, of Eghtham, and having driven it to the town of Sevenak', (Sevenoaks) sold it in the market there to a certain stranger for seven shillings, and immediately afterwards took to flight. The jurors suspect them; therefore let them be demanded and outlawed. The chattels of the aforesaid Robert are worth eighteen pence; for which the Sheriff shall answer. And he was in the pledge of John Ruter of Eghtham; therefore he is in mercy. . . ."

(IV). THE FIFTEENTH CENTURY: CADE'S REBELLION.

In the *Bride of Lammermoor* we read: "if there is onything totally uneatable, let it be gien to the puir folk." I quote this because I think it might aptly be used as a motto for a history of the fifteenth century—indeed for not a few other centuries. As long as the aristocracy and landed gentry in that century could indulge in their murderous wars and intrigues, they took little care for the so-called lower classes. Remembering this, we need not

be surprised that John Cade, an Irish soldier living in Kent, rose to lead a rebellion against such a condition of things in the year 1450.

The chief reason given for revolting was the conduct of the Duke of Suffolk in the negotiations which ultimately led to the total expulsion of the English from France, but the cause lay deeper. It lay in the intense misery and discontent of the people, caused by unjust taxation, and many other evils which cannot be gone into here.

Lord Say, who lived at Knole (near Sevenoaks), was the Lord-Lieutenant, and his son-in-law, William Crowner, was the Sheriff. It was in Whitsun week that the rebellion began. The Constables of several hundreds formally summoned their men together, but many did not wait to be summoned. The Patent Roll of 28 Henry VI tells us that John Thorpe and John Wybern, Constables of Wrotham hundred, duly summoned John Thrope, baker, Richard Thrope, John Mercer, Wills Godewyn, Wills Sawyer, John Smith, and others, of Ightham, to join the army of Cade. I can easily imagine the Constables haranguing the inhabitants on the village green. I can see burly John the smith, with his leather apron on, emerging from his smithy opposite Town House, where John Thrope, the baker, lived. The baker, who was probably the miller as well, would rank next to the lord of the manor for his wealth, but even he would cry out against the bad times, and borrow a large hammer from his neighbour the smith to serve as a weapon. There would be much cursing of the King's Councillors and the Sheriff of Kent. Then the Constables would depart, and messages would be sent to the dwellers at Ivy Hatch, the Old Borough, and other places, to tell them to assemble together on Ightham Green, on the morrow, so that they could all march away in a body. The young men would perhaps go to the Butt field near the Church, and practise their archery, while those elders who could afford it, would perhaps adjourn to the ale-house, and discuss their troubles. Probably Will the sawyer would not be able to buy any ale because the wealthy Knight, Sir Haut, who lived at the Mote, payed him such wretched wages, and perhaps good Master Thrope would treat him to some ale, and tell him that good Jack Cade would make things better for them all.

So the Ightham contingent joined the main body. In this army of 20,000 dwellers in Kent, there were thousands of "yomen," "husbondmen," "bochers," "wexchandlers," "coupers," "maryners," "plomers," "inholders," "taillours," "tylers," "labourers," etc., 74 "gentlemen," 18 "esquires," 1 "Knight," 5 ecclesiastics, 1 notary, 1 scrivener, the Mayor of Queenborough, the Bailiff of Folkstone, and the Constables of Wrotham, and other hundreds.

Cade's army reached Blackheath on Sunday, June 7th, and a Bill of Petitions was sent in to the Royal Council. The complaints were comprised under fifteen heads, the thirteenth being as follows: "The people of the said shire of Kent may not have their free election in the choosing of Knights of the shire, but letters have been sent from divers estates to the great rulers of all the country, the which enforceth their tenants and other people by force to choose other persons than the common will is." Accusa-

tions of bribery and extortion were made against tax-collectors, and also demands for administrative and social reforms. The Council rejected the reasonable petition, and Cade's army retired to Sevenoaks, where Sir Humphrey Stafford, who had followed them up, was promptly beheaded.

At the end of June contingents arrived from Surrey and Sussex, together with the Abbot of Battle and the Prior of Lewes. With his largely increased army Cade marched again to Blackheath, and on Friday, 3rd of July, he entered London, where he was joined by a contingent from Essex. On the 4th, Lord Say and Will. Crowmer were beheaded by Cade's orders, outside the "Standard" in Cheapside. His followers, exasperated by the rejection of a second Petition sent in to the Royal Council, pillaged the city; on the 5th, the citizens fought against them on London Bridge, with no decisive result. On the 6th, negotiations began with Cade for a general "pardon," and as a preliminary he insisted on and obtained the acceptance of the Bill of Petitions by Bishop Waynflete and the Chancellor. A proclamation of "pardon" having been made most of the commons dispersed to their homes. Cade was murdered by a certain creature named Iden, as he attempted to reach the Sussex coast on the 11th of July.

(V). THE TUDOR AND STUART PERIODS.

THE ill-usage of the people, including those in Ightham, by the governing classes did not end with Cade's Rebellion in the fifteenth century, for in the sixteenth we find the condition of the commons far from satisfactory.

We find that Richard Clement of Ightham Mote was present at a meeting of the Archbishop of Canterbury, William Wareham, and certain deputies from the commons of Kent, who "desired to have their loan money again," in the year [1526?] In a letter to the royal council, the Archbishop says he tried to stop them from coming but they came, nevertheless, to the number of one hundred, and out of these, six were chosen as spokesmen. On being asked who counselled them to come they said that "no creature living did counsel them but their own minds, one complaining to the other of their poverty."

His letter is dated from Otford, the 22nd of April. Since Knowle is so near Ightham, I feel sure that some of the poor people there were among the "multitude."

Henry VIII forced money from his people and then called this money a "loan." Archbishop Warham spent £30,000 on his palace at Otford, a vast sum in those days.

Most local histories merely give an account of the aristocracy, and of the people who own the land. Are the people who *work on the land* not worth even a few pages?—I think they are. Elizabeth Clement, the daughter of the Richard Clement before mentioned, was married about the time of this meeting to Thomas Lovelace, of Hever, Kingsdown. This Lovelace was the grandson of Lora Peckham, descended from Martin Peckham, and

Marjory, the daughter of Sir Thomas de Aldham. From William Lovelace, the uncle of Thomas and son of Lora Peckham, descended Col. Richard Lovelace, the famous poet and cavalier, who wrote :—

“ Stone walls do not a prison make,
Nor iron bars a cage;
Minds innocent and quiet take
That for an hermitage.”

The poet was chosen to present the Kentish Petition to Parliament, in 1642. The father-in-law of Elizabeth Clement, John Lovelace of Hever, was one of the grand jury who sat at Deptford, and found a “true bill” against Queen Anne Bullen, on the 11th May, 1536. Hasted says: “Henry Pearce gave by will, in 1545, to be distributed to the poor in bread yearly, the annual sum of 6s. 8d. charged on land now vested in Coyens, and she gave besides to be distributed to the poor in bread at Easter yearly, 4*ol*, now of the annual produce of 2*l*, and for the providing of books for poor children to learn the catechism, the sum of 10*l*, now of the annual produce of 10*s*.

This charity is now dispensed in the shape of twopence given to everyone passing by the “George and Dragon” Inn on the Friday before Mid Lent Sunday. At one time the money was distributed from a square stone block with three steps called a “jossing block,” hence the money was called “jossing block” money.

The “George and Dragon” dates from the sixteenth century. The Knot Badge of the Stafford family occurs on each side of the fireplace in the Commercial Room. The Inn was recently restored, and is a good example of the architecture of that period.

In 1552, an inventory of the Parish Church goods was taken, and reads as follows :—

“ Item—IX December VI Ed. VI.

John Godfre, curat, Willyam Pelset and Willyam Terry [Churchwardens.]

Imprimis one chalice of parcell gilt with a cover.

Item iij bolls.

Item iij coopes, one of velvet, one of russet damaske, one of badkyng.

Item vj vestments with iij albes, one of blew velvet, another of whyte damaske, and iiiij of clothe of badkinge.

Item a hanging for an aulter of blew and redd bredges satten.

* Item ij stremers of towk.

Item iij towells.

Item a dexe cloth.

Item ij crosses, one laten gylt, and the other of latten plate and woode.

We have solde one calis for iij li., and with the some we have payed for glasynge of our church xxxiijs. vi d., for makynge the churche porche doore xviijs. viiiij d.

Item for takynge down the aulters & for pavynge of the places where the said aulters stood iijs.

Item for carrynge the rubbedge oute of the churche viij d.

Furthermore for makyng of the table for communion vj s.

Item for whiting of the Churche ij s.

Item for a locke to the churche door xx d.

Stolen by one Peryman, one albe, iijaulter clothes, ij laten candelsticks, iiiij pewter cruetts, a holy water stopp and iij corporas cases.

The sensers of laten and the shipp to the same also of laten is in the hands of John Choper and the books were delyveryed to the ordinarie.

Certain Stokkes pertaynyng to our churche paied unto Willyam Hyde gent surveyor to our Soveraigne lord the Kynge; the same Willyam received of John Syseley and John Wryght parishioners of Itam for Canes (? Cawnes) light xiiij s.

Item he received of John Hanke for St Nicholas light viij s.

Item he received of Richard Drupp for the lamp in the chauncell viij s.

Item he received of William Baker for the paschall light viij s.

In 1554, the proposed marriage of Queen Mary with Philip of Spain caused a commotion amongst many Protestants who dreaded the iniquities of Spanish Catholicism, and amongst many Catholics who did not desire a foreign ruler. Sir Thomas Wyatt of Allington Castle stirred up a rebellion in Kent, and the troops of the sheriff, and those of Wyatt, under Anthony Knyvet, came in touch with each other at Borough Green. Knyvet avoided an engagement here, and seems to have marched to the neighbourhood of St. Clere, and then to have marched back towards Wrotham, though the details are obscure.

In Blacksole Field, near Wrotham, Knyvet's troops were defeated in a fight with shots and arrows, and fled. Robert Furley, in his account says: "The sheriff continued on the alert, and from time to time kept the privy council informed of the movements of the rebels. He forwarded a deposition of one William Colman, a blacksmith at Ightham, who stated that William, the eldest son of Sir Henry Isley, came to his shop two hours before daylight to have his horse shod, and told him 'the Spaniards were coming into the realm, with harness and handguns, and would make the English worse than conies, and viler;' and as he left the forge, he said with a loud voice—'Smith, if thou beest a good fellow, stir and encourage all thy neighbours to rise against these strangers. I go to Maidstone, and return again shortly.' 'Why,' quoth the smith, 'these be marvellous words; we shall be betrayed if we stir.' 'No!' said Isley, 'we shall have help enough, for the people are already up in Devonshire, Cornwall, Hants, and other places.'"

Wyatt's rebellion, however, came to grief, and he was executed on the 15th March, 1554.

The sum of £3 5s. 3½d. was levied as a 15th on "goods or mooveables" of the parish according to Statue 18, the third year of Queen Elizabeth. In 1573, the "Virgin Queen" made a progress through Kent, and passed through Ightham, on her way from Knole to Birling.

In 1601, Henry Fairbrasse left by will the annual sum of £1 to be given to the poor, to be paid out of certain land in the parish.

Under the year 1602 the name Hodsoll first occurs in the church registers. The Hodsolls were an old and extensive family who owned considerable land at Ivy Hatch.

Mr. Harrison tells me that he has in his possession a tradesman's token bearing the name of the "George and Dragon," ("Henry Greene"), and dated about 1650.

In a Chancery Bill of Complaint, dated 2nd May, 1657, "Hodsoll versus French," occur the following names: "Heavy Hatch" (Ivy Hatch) "ffurnichers," or "ffurningers barne," "Georges" (tenements), "Peckham," "Broomes," "Dickers," "Beards," "Marfeild," "the Old Hopgarden," "Greate Castles," "Little Castles," "Sandfeild," "Sandfeild Wood," "Newland Bottome," and "Highfeild."

We find an echo of the Cromwellian spirit in the following entry in the Ightham Church registers: "1676. ffeare-God-finch, alias Hodsoll, sepulta 6 Feb." ffeare-God-finch may have known Praise-God Barebones for all I know to the contrary.

To this period Ightham Court Lodge belongs.

(VI). THE EIGHTEENTH CENTURY AND ONWARDS.

ABOUT the beginning of the eighteenth century a murder was committed near the steps of the path on the east side of Oldbury. The murderer was caught, and hanged on a gibbet erected on the crest to the south of the path. The body was hung in chains, and remained for some considerable time in that position as a spectacle highly edifying to the morals of the then rising generation. The place of the occurrence is recorded in a map of 1793 as "Gibbet Field,"* and in the Rent Roll of 1839 as "Gallows Field." A certain William Lucas, who went from Ightham to America, in a letter written to the Rev. Mr. Polehampton in 1886, wrote: "The old verse taught me when a boy I often repeat, and it leads my mind to the time long since gone.

I, Oldbury, of a bloodthirsty mind,
Prompt by the Devil to thieving,
To murder was inclined;
When with Will Woodin I did meet,
And bore him company,
Surely then I did him greet,
But full of treachery.
I cut his throat from ear to ear,
Cruel and inhumanly;
And for that crime I suffer here
And die upon a tree."

In 1705, George Pettey left by will the annual sum of £5 4s. to be dis-

* The mill on Gallows Hill was burnt down in 1905, and on digging about the foundations the iron cage in which the body was hung was found and is now in the possession of Col. Bailey of Ightham Court Lodge.

tributed in bread to the poor every Sunday, and to be paid out of lands invested in the Evelyn family. Before 1712 the family of Hooker removed from Oldbury to Peckham. This family erected buildings where the "Cob Tree" public house now stands. A small one-storey cottage still remains, and is known by the curious names of "Rat's Castle" and "Ranter's Hall."

In 1720 Elizabeth James left by will, for the education of poor children, the annual sum of £5 to be paid out of certain land in the parish.

In 1759 Quebec was taken by General Wolfe, and the province of Canada was ceded to Britain by the treaty of Paris in 1763. Sir Jeffrey Amherst was one of those who fought in the war, and he won a battle at a place called Crown Point, near Montreal. From this circumstance, and from the fact that the neighbourhood is considered suggestive of the place where he won his victory, Crown Point Inn, near Seven Wents, derives its name. The portrait of Sir Jeffrey is painted on the signboard that hangs from the branch of an old pine tree opposite the Inn. He died in 1797 at the family seat called Montreal at Riverhead.

In 1808 the population of the parish numbered 709. In 1849 it contained 1039 inhabitants, and in 1901 the number was 1286. In 1849 the parish comprised 2400 acres, of which 350 were common or waste, and 760 woodlands, leaving 1290 acres under cultivation; the living was valued in the King's books at £15. 16s. 8d.; the tithes had been commuted for £650; and the glebe comprised six acres.

From Mr. Harrison I learn that the late Col. James of Court Lodge told him that the living of Ightham was *conveyed* away from the Manor about eighty years ago (1824?), or in other words that the estate had been robbed. In a letter written to Mr. Harrison in 1878, Mr. Robert Furley, F.S.A., says, "I believe that neither the manor nor the advowson of the living ever belonged to the Church: had it been so, some rights connected with the Weald might have been preserved—the clergy always being tenacious of their rights."

About 1844 Oldbury Hill was extensively quarried for stone. The stone was taken to the Medway, and carried on barges to London, where it was used to pave the Edgeware Road, according to the new method introduced by Sir John L. Macadam, who died in 1836. In order to house the workmen employed for several years on the stone-quarrying, two rows of low one-storey cottages were built on Ightham Common, as temporary dwelling places. When the work was finished these cottages were allowed to remain.

Mr. Harrison tells me that his grandfather would appear to have been the inventor both of the steam dredging machine and the traction engine. The latter he made and got to work because the men wanted such extravagant terms for hauling the stone raised. However the exhibition of the powers of the traction engine reduced them to reason, but Mr. Harrison never heard that the invention was ever put on the market. It would be interesting if more could be found out about this pioneer traction engine, especially as Ightham is not far from Rochester where the majority of these machines are now made.

In Georgian and early Victorian times Ightham was a smuggling centre.

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I have been told that caves on Oldbury were used for the purpose of hiding smuggled goods. Hasted (1798) says, "Just on the brow of the hill is an entrance into a cave, which has been long filled up by the sinking of the earth, so as to admit a passage but a very small way into it, but by ancient tradition, it went much further in, under the hill."

The "Railway Bell" Tavern opposite Town House commemorates the time when the railway was first brought to Borough Green. It formerly bore the more poetic name of the "Daedalus Arms." One of the owners, who was a builder dedicated it to Dædalos, the god of builders, carpenters, etc., the supposed inventor of the saw, the axe, the gimlet, and other tools.

J. SCOTT TEMPLE.



CHAPTER IX.

OLD ROADS.

" You road I enter upon and look around, I believe
you are not all that is here,
I believe that much unseen is also here."

WALT WHITMAN.

THE most important of the old roads passing through the parish is the famous track commonly called the " Pilgrims' Way," which runs along the base of the North Downs, passing through Ightham parish about a mile north of the Church. It runs across the country from Watling Street, near Canterbury, until it joins the trackways of Surrey, Hampshire, and Berkshire, and formerly skirted the forest of Anderida. At Exedown a branch of it leads up to the crest of the hill, and ancient yew trees still stand to mark the way. Traces of another branch running in the direction of Ightham Church can also be observed. At St. Clere a branch of it runs, *via* Buckwell field, to Styants Bottom, and enters Oldbury Camp *via* Ives and Brooms plain. There is little doubt that the Pilgrims' Way dates back to the Bronze Age, if not to Neolithic times. Ingots of tin, and hoards of bronze, have been dug up on the route, though there is no record of such having been found in this parish. The original flint pavement of the Pilgrims' Way as it runs through Surrey has been met with in several places. It avoids the modern centres of importance, but not the ancient ones, for many tumuli, and prehistoric camps, such as Oldbury, are found along the route, or not far from it, on each side. This fact bears witness to its having been a main road in those long bygone times.

It derives its present name from the use made of it by pilgrims, in mediæval times, who travelled to the shrine of St. Thomas à Becket at Canterbury. Pilgrims going to shrines abroad also used the route. In a charter of Edward III we read that, "no pilgrim shall pass out of our Realm to foreign parts except from 'Dovorr' under the penalty of imprisonment for one year." Hence this road must have borne a great amount of traffic, since there were fewer ways to Dover then than there are now.

There has been much discussion concerning the main Roman roads running through Kent—one route has been accepted and then another. Mr. George Payne, F.S.A., says in *Collectanea Cantiana* : "As we do not hesitate to say that there was a great Roman Road through Kent passing along the northern edge of the Forest of Anderida, we are decidedly in favour of that

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one which on leaving London runs by way of Foot's Cray, Farningham, and Wrotham, where it joins the *military way* of the Saxon charter, and so on to Maidstone." This *military way* is the main road from Maidstone to Ightham, and is mentioned in a charter of Edmund, King of the Angles and Mercia, granting lands at Malling to Burhric, Bishop of Rochester, *circa* 945 A.D., and it is a Roman road.

It leads from Ightham to Oldbury, and from thence to Seal, from thence to Keston (Noviomagus ?) and from thence to London. An old trackway runs from Kent Street near Mereworth, through Hurst woods, passes Broadfield (Roman Interventions), then the Roman villa on Allen's Farm, near the Roman cemetery on Thompson's Farm, then through Plaxtol to Ivy Hatch by Rose Wood. Mr. Payne says this road is known up to this point as the Redway or Ridgeway, and was known as the "Old Plaxtol Road." Pursuing its course it takes the name of Stone Street, and passing through the village of that name it joins the *military way* running from Ightham to Seal. A British trackway crosses Stone Street, from South to North, and runs from Wilmot Hill to Oldbury.

Mr. Harrison thinks it probable that an ancient road running from Pevensey and Tonbridge led to Shingle Hill (Roman remains), and branched off at the latter place to Stone Street and Raspit Hill. In Pevensey field at the foot of Raspit Hill an uninscribed gold British coin was found, and Mr. Harrison has found a large number of Neolithic implements and flakes in the immediate neighbourhood. One of these, an elongated oval shaped flint knife, he describes as the best he has ever seen.

Raspit Hill has been an important place from Neolithic times downwards. The name is evidently a triplicated one. "Ras" from the Keltic *ross*, a hill or promontory, from the Aryan *ras*, a cape or land jutting out; "pit" from the Norman-French *pic*, a peak or promontory; "hill" from the Anglo-Saxon *hyll*, high ground. Hence we might expect it to be a meeting place for old roads. "High Cross" near by is indicative of roads crossing.

The word "street" as it stands, often corrupted to "stead" or "sted," signifies a roadway, and is derived from the A.S. *stræt*. The Roman word *stratum* also supplies a derivation, but *via* was more commonly used. Ightham Village, situated on the Roman military way from Maidstone, is at the present day referred to as "the street," and on a map of the seventeenth century it is marked as "Ightham Street." Stone Street indicates the "paved way; Redway probably means the "riding" or "carriage way;" from the A.S. *rād*, a riding, *ridan*, to move, or from the Keltic *rheda*, a carriage. Ridgeway means the "furrow-way" because it would look like a large furrow in the earth with ridges on each side composed of the soil thrown out in making the road; from the A.S. *hrycg*, the back. This furrow-like appearance is characteristic of old roads. The Ridgeway running from Cophall to Rose wood and thence to Stone Street through Maens or Mains field (query—from Keltic, *maen*, a stone?) presents this furrow form and is consequently commonly called the "Roman trench."

At the Seven Wents (Local Kentish, *went*, a road, from the A.S. *wenden*, to turn, *windan*, to go). We have a meeting of seven old roads at

the *military way*. One of these is called Longstead Lane. Mr. Harrison informs me that he noticed in the documents shown at a Court of the Baron held at the George and Dragon, in 1898, that it was written as *Long street* lane. It runs to the tumulus above Redwell, and there were Keltic interments on both sides of the route. This road has been diverted to meet the road leading to the "Old House at Home," but the original road can still be traced though it has not been in repair for more than thirty years. The reader is advised to walk on the original track, on the principle that he has the right to do so.

At Borough Green Farm we have the place-name of Stangate. This probably means the "stone-way" from the A.S. *stan*, and *geat*, a way.

Mr. Harrison points out that besides the road, there are four old paths or trackways radiating from Court Lodge. One leads to Aldham St. Clere, and was probably the road used by the rebels in Wyatt's Rebellion when they approached "Master Peckham's house at Yollam." Another leads to Oldbury.

J. SCOTT TEMPLE.

CHAPTER X.

THE IGHTHAM BEACON.

THERE is something peculiarly fascinating in the idea of a beacon. Its blazing pile flaming forth through the night the signal of alarm of war, of peace, of life and death, is the very poetry of fire. As a means of communication its use is immemorial, and it served the same purpose in olden times as the semaphore did later on—the precursor of the electric telegraph.

Kent, being the country nearest to the continent, was well supplied with beacons, and one was placed on Raspit Hill, near Ivy Hatch, (see "Old Roads.") From this circumstance it is called also Beacon hill. In the "History of the Spanish Armada," published in 1759, we read: "Queen Elizabeth, having very good Intelligence of all these mighty Preparations of Arms and Shipping by the King of Spain, &c., to make a Conquest of Britain, made the best Provision possible to give the Invaders a warm Reception. One of her first Cares was to get the Nation in Arms, especially the Maritime Counties. And, for this end, in June 1588, she sent to all the Lord Lieutenants, to prepare her Subjects within their respective Lieutenantances for Defence of their Country, their Liberty and Religion, their Families, Lands, and even their lives."

In this same book is "A MAP of the BEACONS of KENT as they were appointed by SR WILLIAM BROOKE LD COBHAM, LD Chamberlain to QUEEN ELIZABETH LD Lieut. of Kent."—From Lambard's "Perambulation of Kent" we find that the beacon named "Itham" received intelligence by fire from the Kentish coast, *via* Coxheath and Gowhurst, and transmitted it to the beacon on the high hill of Crowborough. London received its intelligence from the Hampstead Heath beacon, which in turn received it from the Kentish coast, and the mouth of the Thames, *via* Coxheath and Halling.

Watchmen were appointed for each beacon, and in a document relating to a dispute with regard to the watchmen at Denge Marsh, we read: "Beacons were commanded to be set up, and watches to be kept—First by veiwe of the plott of the saied Beacons it will appeare that those 6 Beacons in the 7 hundreds doo all stand on the sowth side of Kent against the midst and broadest parte of the shire and doo take their light from Fareleigh Beacon in Sussex, wch Beacon hath veiwe of all the Beacons on the Downs betweene Lewes in Sussex and Dover in Kent. And that the saied 6 Beacons doo geive light to 4 other Speciall Beacons of Kent, *viz.*, Westwell, Coxhoth, Ightam, and Birlinge, and that for these reasons

as it seemeth the said Commissioners that were appointed in Edw. 3 tyme for the establishing of Beacons had a speciall care to provide so many Beacons in the 7 Hundreds: considering wch all that all those 6 Beacons in the 7 Hundreds standing in lowe growndes and being very wooddye and full of trees, might more easily be discerned and geive light to the other 4 Beacons at Westwell, Coxhoth, Ightam, and Birlinge, then yt there had been but one, two, or three in the 7 Hundreds."

From this lucid account it appears that there was a beacon on Raspit hill in the time of Edward III.

J. SCOTT TEMPLE.

CHAPTER XI.

THE CHURCH OF ST. PETER, IGHTHAM.

THE Church of St. Peter, Ightham, most prominently and picturesquely situated, is interesting as illustrating the usual style of parochial churches during the middle ages. There is no architectural evidence for the existence of a Saxon structure, the earliest existing work being the chancel dating from the earlier half of the twelfth century. Many of the quoin stones, especially those of the south-east angle, are roughly squared blocks of tufa—a material usually associated with Norman work in this district. (See Geological section). The chancel, in plan, is roughly square, and this with the round headed blocked lights in its eastern wall, further strengthens the claim for twelfth century work. Similar lights were seen in the undoubtedly Norman work in Offham Church.

Of the complete Church during the twelfth century there is no satisfactory evidence, but it seems not to have deviated from the well marked Norman features at Offham and Bosham, *i.e.* a simple square limb attached to an aisleless oblong nave, probably lacking a tower. The structure remained unaltered till the fifteenth century, when the great wave of architectural enthusiasm reached the secluded village, and building operations began on a comparatively large scale. The Norman nave was then swept away to make room for the present nave and tower, the form being still further altered by the addition of north and south aisles. The high set Norman lights of the chancel, suggesting the fortress rather than the church, were blocked up and the existing windows were inserted. The only inserted window calling for remark is that in the north wall; the curious ornament of the cusp points is uncommon and forms good evidence of the general decadence of Gothic art during the latter part of the fourteenth, and beginning of the fifteenth centuries. Its square headed rear arch is not only bad in proportion but poorly worked, though the latter defect may be caused by later reworking.

The arches of the south aisle are typical of the fifteenth century but present little of special interest. The roof however is of interest, and the coarsely worked human heads seen in its tie beams are suggestive of the village carpenter. At its eastern extremity the south aisle is cut off by some much restored screen work to form the Chapel of St. Catherine which still contains the piscina of the destroyed subsidiary altar. The window in the south wall has some fragments of ancient glass representing Henry VII and his Queen; they came from the Mote House.

The south porch, an addition of the same period as the south aisle, has a

good contemporary oak roof, and the inner door still retains the ancient closing ring and roughly forged nails all indicating local workmanship, and no doubt made from iron obtained from local Wealden sources.

The north aisle is a still later rebuilding of about 1600, and although clumsy and somewhat ill proportioned is of considerable interest as showing an attempt to resuscitate the almost lifeless corpse of Gothic architecture; the responds of the arcade may be mentioned as clumsy imitations of the earlier fifteenth century work.

Attention may now be directed to the decorative and memorial features of the building. The lack of the usual chancel arch is a noteworthy feature, the division between nave and chancel being made by a modern screen occupying the site of an earlier one, the supports to which can be seen immediately above. High up in the wall are two similar projections, once supporting the Rood and its beam. On the south wall of the chancel is a fine alabaster tomb with two recumbent effigies to the memory of members of the Selby family once of Ightham Mote. On the eastern wall of the chancel is a large monument to Dame Selby. (See p. 82).

Of much greater interest is the fine effigy to Sir Thomas Cawne, who by his will left £20 for the erection and glazing of the window over the tomb. This beautiful recumbent figure is life-size, and has several points of interest beyond its antiquity. The armour is highly enriched, the fine ornaments of the gauntlets and sword belts being particularly good; indeed in this respect the effigy is finer than that of the Black Prince in Canterbury Cathedral. On the head is the bascinet, a light conical helmet to which is attached the camail, a chain mail protection for the neck; it is secured to the bascinet by means of a cord laced through a series of eyes and fastened to a fixed stud. In this instance the camail lace is protected by a highly enriched band of metal not seen in many effigies of this period. The obvious danger of the severance of the camail lace during combat was not, apparently, recognised by the armourers of earlier mediæval times. In the fight between Sir Lancelot and Sir Turquaine, it is said that the former "rushed fiercely upon his adversary, rased off his helm and smote his neck in sunder." The term "rased" evidently means cut, especially when by cutting the camail laces that defence would slip and expose the neck to the sword of the adversary. The lower points of the body are protected by plate armour fastened at the back and attached to a leather lining. On the feet are subutouns, thin plates of metal attached to leather to allow of free movement when on horseback. Attached to the swordbelt was the misericorde—a small dagger, now unfortunately destroyed. Its use was to give the *mercy stroke* to a wounded adversary. That, however, it served other and less chivalrous purposes is shown by a proclamation by Edward III, prohibiting the brandishing of the misericorde. Another point of interest in this effigy, and an unusual one, is that the head is supported by pillows, and not by the great helm worn in combat.

There are several brasses in the nave and chancel, the most interesting being that to Jane Dirkin, 1626, and well illustrating Jacobean costume; a rubbing of it hangs in the porch.

The Story of Ightham.

The western tower, of plain 15th Century work, contains six bells, of which two bear pre-Reformation inscriptions:—

- No. III bears "Amice Christi Johannes." Founder's initials, V. W.
- No. IV "Vox Augusti sonet in aure Dei."
- No. VI "John Milnar made me, 1620."

Some of the nave pews show good Jacobean work, and the fine Jacobean pulpit was many years ago ruthlessly cut up and made into a sort of reredos for the altar.

Another link with the past, which in many places has long since vanished, is the sundial bearing the inscription: "1669. In publicum designatum Robert Cutbush fecit."

J. RUSSELL LARKBY.

NOTES ON THE CARVED GRAVESTONES IN IGHTHAM AND OTHER KENTISH CHURCHYARDS.

As a rule it is only the monuments in the church that excite any attention or interest and for the most part those in the churchyard are neglected, and yet in the sense that they seem to afford connecting links with prehistoric times, these are more interesting than those more elaborate and better preserved ones inside.

For a long time it would appear to have been the rule that only the notables were buried inside the church and those of lesser degree outside; these latter either could not afford any permanent memorial or perhaps there was some sumptuary law forbidding such, repealed or lapsed some three hundred years ago. The bodies previous to this were consigned to the earth wrapped merely in their *grave-clothes*, whence perhaps the origin of that term. They would seem to have been carried to the grave in the parish coffin or on a bier and then consigned to an earth burial.

It is because of this, and the absence of the coffin, that they so soon returned once more to the earth, and thus the often small area of the God's-acre served without over-crowding for many centuries.

There was also at a later time, a great disinclination to be buried on the north side of the churchyard, hence we find that on the south side the ground is raised much higher than on the north.

In more modern times the general introduction of the coffin soon led to an over-crowded state of the churchyard and to the extensions that have now become so general, and failing these to the modern Cemeteries, which latter no doubt will give way before long to communal Crematories.

But nothing can exceed the pathetic beauty of the old fashioned God's-acre with the moss-grown memorials of the dead; especially when accompanied by the stately yew-tree, hoary with age yet vigorous still, with its gnarled and knotted trunk of deep ruddy hue expressive of massive strength and endurance. And how strangely the coral cups of the yew fruit, glowing like tiny death lamps, contrast with the deep solemn green of the foliage; the evening breezes playing through its branches a



Fig. 1.



Fig. 2.



Fig. 3.



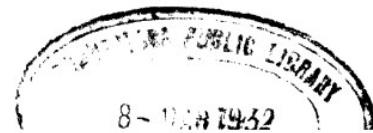
Fig. 4.



Fig. 5.

Photographs:

[Mr. E. W. Filkin]



kind of *Æolian Dead March*. Truly a typical tree for a memorial of the long departed dead.

In our Kentish graveyards we have a most interesting, rude, and yet often most artistic, set of gravestones, some types of which are peculiar to an area of which West Malling would appear to be the centre, as that graveyard has the best collection of these peculiar types.

The writer has made a special study of these, and for some time thought that no one else had noticed them, till his attention was called to some articles by W. T. Vincent in the "Kent Magazine" of 1896, in one of the few numbers of that short-lived publication.

The writer, however, has followed these peculiar types over a considerable area and finds that they die out at some eight to twelve miles to the east, west and north, but have a longer radius to the south of West Malling.

These special and peculiar types he has classified and arranged according to the rudely executed heads that are cut in shallow grooves upon them and has had more than a hundred photographs taken of them, besides himself making a great number of rubbings. So much are the stones in most cases obscured by the growth of lichen, that until it is removed little or nothing can be made out. The first thing that particularises these rudely executed stones of local Kentish Rag, quarried and chosen with such care that some have lasted for nearly 300 years, is that they have Late Perpendicular mouldings and that they mostly face to the east, the better to preserve the carving and lettering from the elements, and are chamfered off at the back to throw off the rain water. The stones are massive and the moulding and lettering beautifully and deeply cut, contrasting so strikingly with the rude carving of the faces that they evidently show they are the work of the mason and that the artist had no hand in the matter.

The earliest stones that the writer has seen are plain ones, *i.e.* have no heads carved on them and are of simple ogee pattern, or what might be termed "head and shoulder" type, and may possibly at one time have been meant as a rude imitation of the human form. The earliest one however seen by the writer is not quite plain and has a repeated ogee moulding and an hour glass rudely carved. It is dated 1623 and has a quaint inscription, but all this was quite invisible until the lichen had been removed. This stone is in Barming churchyard. The next earliest plain stones, having only the name of the person, date from 1668 to 1680-90. The one at Ightham is dated 1673. It is of the head and shoulder type bearing the name of Alice Sayer. FIG. I. The various types of the figure stones have been arranged thus by the writer.

1. *The Skull.*
2. *The Cherub.*
3. *The Profile.*
4. *Emblematic stones.*

1. *The Skull* of course is the emblem of death. The writer has divided this type into two divisions.

- (a) The Doll's-Head Type.
- (b) The Face-Type.

(a) *The Doll's-head Type* he so names because the skull is so like a Dutch-doll's head. It is meant for, and very fairly represents a full-face view of a skull, the two circles being the orifices of the eyes, and the triangle often rounded at the base, that of the nose, and the line of squares stands for the teeth, the crossed bones coming underneath; later on, the teeth become very small and a rude mouth is added, and still later a better mouth and the teeth are then left out.

The Ightham Stone is of this type, but with a single, and not crossed bones as usual. (FIG. 2.) It is that of John Brigden and is dated 1730. It is of a low "head and shoulder" type. The lettering is very clear and good.

(b) *Face-type of Skull*. The writer has so termed this type, because facial features are added to the skull, a long oval, such as wrinkles under the eyes, etc., with the mouth well indicated, no teeth being shown. The bones are crossed at the back of the head. (FIG. 3.) The Ightham example is a very good one and has a late Perpendicular moulding with very clear lettering: the date is 1708, a very early one for this type.

2. *The Cherub*. The emblem of the resurrection, dates from an early to a late period. The early ones are evolved from the face-type of Skull, wings being squeezed in at the sides and a dart shown at the back, the barb and point only appearing, and are confined to the late Gothic pattern of stone.

They are not very common and there is no example at Ightham.

The later cherubs are often very finely carved, and the stones are of a classic and renaissance pattern, and being broad give plenty of scope for the artist and sculptor whose hand is very evident here, the figures being carved in high relief. This example is a most artistic one, as (FIG. 4) clearly shows.

Another very good example is (FIG. 5) from Southfleet, with a cherub's head in the centre, closed Book of Life on one side, and the serpent with tail in mouth, the emblem of eternity, on the other.

3. *The Profile*. There seems to have been an early attempt to give the likeness of the deceased, an' a stone at Offham and one at E. Malling, both late seventeenth century, seem to show this.

The attempt at portraiture seems, however, soon to have been abandoned, and a purely conventional way of indicating the person adopted, indeed, so conventional that no difference was made to indicate the sex, as in the double-headed stones, where both husband and wife are shown, the two are absolutely alike.

All these profiles face to the right, and the hair (?) is very grotesquely rendered in a series of stiff curled loops, getting shorter as they reach the top of the head.

The earliest dated Profile 1717, is at W. Malling, and this gives us the clue. This one is unique as being quite artistic, and seems to have been copied from a coin of George I, when this king's head faced to the right, and what appears afterwards as stiff curls is here seen to be a wreath. Next to this stone at W. Malling is one dated twenty years later, and then we see how the wreath has degenerated into the stiff curls, and the whole execution has become debased. It would seem that succeeding stones were copied from each other, each, in turn, getting further away from the original



Fig. 6.



Fig. 7



Fig. 8.

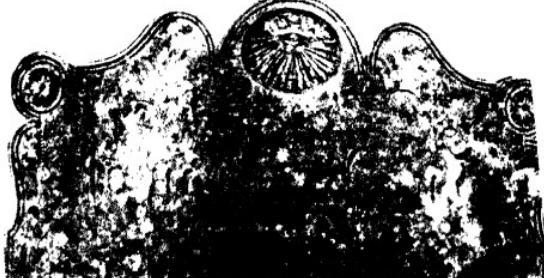


Fig. 9.

pattern. (See profile dated 1749). At Seal where the Profile type dies out to the west, the deterioration seems complete, as here the worst examples are found. One double-headed stone close to the chancel wall at Seal, erected to a husband and wife is unique. The figures are alike, but, to distinguish one from the other, the husband is provided with a pipe. FIG. 6 gives several examples of Profiles taken from rubbings from stones in Mere-worth, West Malling, and other Kentish churchyards.

We ought also to mention that in the case of the double-headed gravestones, both of the profile and skull pattern, instead of a repetition of these we often have either two hearts tied together by a ribbon, showing that the couple were faithful unto death; or an hour-glass, from which a transition may be traced to the two hearts.

Emblematic Stones. The most striking one is that known as the "Rag Doll." (FIG. 7.) This infantine figure, most grotesquely rendered, is seen holding a trumpet in one hand, and in the other an Imperial crown, which it appears to have taken off from the skull below. This probably represents the Angel of Life overcoming Death, and taking away from him his kingly emblem. Some rude cherubs are here seen amongst conventional clouds, and there is one very well designed initial letter.

Another very well executed stone of late date (FIG. 8) shows a weeping figure and a winged hour glass indicating the passing of time, while another one (FIG. 9) shows the all-seeing eye of God.

This latter type is not very common, and Ightham has three illustrations. Can there be any connection between this emblem and the name of the place? May we consider the skull and cherub types as indicative of a progress in religious belief? viz., in the skull, a belief that death ends all, and in the cherub, that there is a life beyond the grave. The later skulls, to which wings are attached, here indicate the passing away of death.

Mention has been made of the relation of the modern gravestone and grave, to prehistoric stones. Briefly we may say that the grave mound represents the tumulus and cairn, and we may also see in the custom of scattering the earth on the coffin a survival of the heaping of the stones on the cairn.

The upright stone recalls the menhir, and in the table tomb we see the survival of the Dolmen, and in this type sometimes the top stone rests on supports, the resemblance is then much closer.

The old stately funeral processions once so common, the mutes, plumes, etc., recall the retainers of the old chief and the ceremonial of carrying him to his grave.

We trust that these brief notes on one of our old Kentish churchyards and of its gravestones may invest such with fresh interest and a desire on the part of the student to preserve them as long as possible.

NOTE.—The illustrations are from photographs taken expressly for the author by Mr. E. W. Filkins of Gravesend, who must now have taken about 200, and who has made lantern slides to illustrate the various types.

CHAPTER XII.

IGHTHAM MOTE.

HERE and there scattered over the country are to be found ancient buildings which may be deemed pages of English history written in timber and stone, which having survived the storms of centuries, are in many cases to be erased by the modern RESTORER, whose handiwork is found in so many village churches.

The County of Kent, so full of historic associations, is rich in mediæval buildings, both domestic and ecclesiastic, from whose construction and decoration much can be learned of the skill of our ancestors and of the customs of every day life in the middle ages.

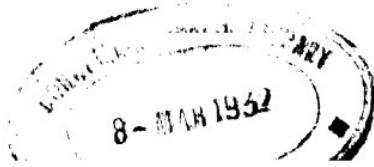
The careful study of such buildings as Ightham Mote affords a vast amount of information as to the mode of living adopted by our ancestors, and also of their varying personal needs, and the methods by which such were satisfied as the conditions of life improved and knowledge increased.

Just as the simple Saxon church, consisting of a chancel and nave, gradually developed with the early religion, into a larger building by the addition of aisles, etc., in a like manner did the houses and castles of the nobles evolve.

Similarly has Ightham Mote grown, as will be found by inspection. In all probability the present dining hall is all that is left of the early building, of which it was the dominating feature, and here my lord ate, drank, and entertained his guests.

What a simple story the moat itself tells of the period in history when the house was not only the residence of some noble lord, but also a military post. Study the variation of the building materials and workmanship, which have braved the storms of a period extending over seven centuries and are still in a splendid state of preservation. One can ramble over this old house, which is unique of its kind, and find links with the past which, when placed together, form a faithful record of bygone days.

It lies at the lower entrance of a beautifully-wooded gorge, at the other end of which, at the top of the Greensand escarpment, stands the hamlet of Ivy Hatch. Through one of the arms of this gorge, called Dinas Dene, sloping down from Ivy Hatch, runs a little stream, which, carried under the bowling green of the Mote by means of culverts, discharges itself into the moat surrounding the house. Thence it flows through a small lake in the grounds, into the valley of the Shode, which river it joins near Hamptons.



Ightham Mote.

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The first owner of the Mote, of whom there is any record, was Sir Ivo de Haut, who possessed it about 1180 (temp. Henry II), a list of the subsequent owners, amongst whom will be noticed the notorious Brackenbury, will be found below.

FAMILY.	NAME OF OWNER.	DATE.	REIGN.	REMARKS.
De Haut ...	Ivo or Sir Ivo ...	c. 1180	Henry II. ...	—
" ...	Sir Piers(FitzHaut)	c. 1240	Henry III.	Steward of the King's Household.
Cawne or Couen	Sir Thomas ...	c. 1340	Edward III.	Buried at Ightham, and supposed to be the builder of the hall at The Mote.
De Haut "	Robert ...	c. 1374	"	High Sheriff of Kent in 1371 (?)
De Haut ...	Henry ...	c. 1377	Richard II.	High Sheriff of Kent in 1478 and 1482. Beheaded in 1484 at Pontefract and estate confiscated.
" ...	Richard ...	c. 1450	Edward IV.	Governor of the Tower of London, and killed at Battle of Bosworth.
Brackenbury	Sir Robert ...	1483-4	Richard III.	Estate restored by Henry VII.
Haut ...	Edward ...	1485	Henry VII.	Bought the estate and built the chapel.
Clement	Sir Richard ...	1521	Henry VIII.	Married a Clement heiress, and sold the estate.
Pakenham "	Sir John ...	c. 1532	"	—
Pakenham	Hugh ...	c. 1544	"	—
Allen	Sir John ...	1544	"	Bought the estate: he was Lord Mayor of London.
" ...	Sir Christopher ...	c. 1559	Elizabeth ...	—
" ...	Charles ...	c. 1580	"	Sold the estate.
Selby	Sir William ...	1591	"	Mayor of Berwick, and knighted by King James at Berwick in 1603.
" ...	Sir William(nephew to the last) and others ...	1611	James I. ...	Husband of Dame Dorothy, who revealed the Gunpowder Plot to Lord Monteagle. She and her husband and uncle are buried at Ightham.
Luard Selby	Lewes Marianne ...	1868	Victoria ...	—
Colyer Fergusson	Thomas C. ...	1889	"	Bought the estate.

The Story of Ightham.

One cannot look down this list without referring to Dame Dorothy, wife of Sir William Selby, whom tradition associates with the discovery of the Gunpowder Plot, as set forth on the monument erected to her memory in Ightham Church.

The inscription reads as follows :—

D. D. D.

To the Precious Name and Honour
of
DAME DOROTHY SELBY,
the relict of
Sir William Selby, Knt.,
the only daughter and heir of
Charles Bonham, Esq.

She was a Dorcas,
Whose curious needle turned the abused stage
Of this lewd world into the golden age ;
Whose pen of steel and silken ink enrolled
The acts of Jonah in records of gold.
Whose art disclosed that plot, which, had it taken,
Rome had triumphed, and Briton's walls had shaken,
In heart a Lydia, and in tongue a Hannah,
In zeal a Ruth, in wedlock a Susannah ;
Prudently simple, providently wary ;
To the world a Martha, and to Heaven a Mary.

Who put on immortality in the year	{	of her Pilgrimage 69. of her Redeemer 1641.
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Above the monument are the arms of the Selby and Bonham families. The meaning of the pictures on the tablets, and the words,

“ Whose art disclosed that plot, which, had it taken,
Rome had triumphed, and Briton's walls had shaken,”

has given rise to some controversy. Mr. Thomas Selby, a descendant of the Northumberland Selbys in the female line, wrote in the *Gentleman's Magazine* (1863) with regard to the letter which was supposed to have revealed the Gunpowder Plot, as follows : “ The letter is stated in Rapin's *History of England* to have been delivered to Lord Monteagle's servant by an unknown person (26th October, 1605) with a charge to give it into his master's own hand, and the writing was unknown and somewhat ‘unlegible.’ Lord Monteagle carried the letter to Cecil, Earl of Salisbury, who either thought, or pretended to think, little of it; and the affair was dropped till

the King, who had been at Royston, returned to town, when the letter was further considered, and the plot was scented. Most authors attribute this to the sagacious timidity of James, who was fond of the reputation of this discovery, and publicly assumed the credit of it."

"When the Earl of Suffolk, then Lord Chamberlain, went himself to search the cellar where the powder was, and saw the coal and faggots with which it was covered, he asked Whyneard, the Keeper of the Wardrobe, who attended him, to what use he had put the cellar; Whyneard answered, that Mr. Percy had hired it."

" . . . There is an old tradition that it was Dame Dorothy Selby who discovered the meaning of the anonymous letter; and a report, less well founded, adds that she discovered it by working it on a piece of tapestry. I cannot vouch for this latter report, but the following facts are beyond dispute. My great-great-grandmother, Dorothy (the daughter of Sir Henry Selby, Kt., second son of George, cousin of Sir William Selby, the husband of Dame Dorothy), handed down this tradition to her children, and as such it was stated to me by my grandmother, the late Mrs. Selby, of the Mote, who died in 1845, at the age of 90."

The first glimpse of the Mote itself carries one's thoughts back to the 14th and 15th centuries; whilst a careful inspection of the various materials used in the building of the house speaks volumes as to the knowledge of and skill of our forefathers in architecture and building construction, for every feature seems designed with beauty and built in truth, which cannot be said of the majority of modern buildings.

The moat is rectangular, measuring approximately 58 yards by 55 yards. It is spanned by three bridges, leading to a quadrangular house enclosing a court-yard. The principal bridge, on the west side, is of local ragstone, carried by two segmental arches, and conducts to the main entrance under the tower, a massive Tudor double gate with wicket, which allows the visitor to be seen from within without his knowledge.

Over the gateway, between the first and second floor windows, is a partly decayed stone panel bearing the arms of the Selby family, who for several centuries owned the property.

The tower is built of ragstone, capped by a brick battlement with stone dressings, and (with the exception of the turret added by the present owner), was probably built, in conjunction with the whole of the western side and its return ends, by Edward Haut in the reign of Henry VIII.

The accompanying illustration will perhaps give the reader some idea of this part of the building.

It is quite likely that the stone walls to the ground floors of the remaining elevations were built in the 15th century, but the upper part, which is mostly in half-timbered work, is of course of a later date, being partly Elizabethan, as will be seen from the illustration of the N.E. corner of the courtyard. Many examples are to be seen in the E. elevations, and also in the stables which lie on the s.w. side.

The court-yard, which can be entered direct from the north and west sides, is most picturesque.

The chief architectural features of note, and of which illustrations are given, are the Elizabethan-looking gables with carved barge-boards, in which the rose, thistle and shamrock are intertwined, and the fine Perpendicular window to the old dining hall.

Having endeavoured to give the reader some idea of the external character of the house, I will now treat of the interior.

Thanks to the courtesy of Major-General C. E. Luard, the writer is able to quote extracts from his valuable booklet on the Mote, to which the reader is referred for more details of the many interesting archæological problems connected with this building.

Commencing on the ground floor of the west wing is the morning room, "long and low with deeply recessed windows and a finely designed oak chimney-piece, erected in 1856 by the late Major Luard Selby. Adjoining this is the space supposed to have been a dungeon, 15ft. by 5ft., to which access was obtained from the first floor of the tower. "On the north side of the archway is the billiard-room, made so by the present owner," with oak panelled walls, grotesque corbels under the ceiling beams, and cosy ingle nook, making a very pleasant room lighted by a deeply splayed window overlooking the dark waters of the moat. Despite its modern adaptation it is in thorough keeping with the older rooms, and with the other work carried out by Mr. Spokes of Oxford.

"Over this is the old drawing-room, 40ft. by 17ft., with the remarkable Jacobean oak chimney-piece, the work of the second Sir William Selby, about 1620-30. Especially noticeable is the carved oak border surrounding the conchological marble front of the fireplace, the latter being apparently a subsequent addition, and possibly of the same date as the singularly ugly Classic window which has replaced the fifteenth-century window at the north end of the room. The walls of this room are hung with an extremely old Chinese paper, supposed to be about two hundred years old, which has been recently restored with great care, and an additional fireplace at the n.w. angle has also been recently added. The paper is surmounted by a carved oak frieze with Saracens' heads (the Selby crest) at intervals. The passage leading to this room and the small tower-room are oak panelled, with linen-roll panelling from floor to ceiling.

"A door leads from this drawing-room to the chapel staircase (recently rebuilt and panelled), which is surmounted by an eighteenth-century bell turret and clock, and also to the chapel, the reconstruction of which has just been very successfully completed without in any appreciable way altering its character, and with as little disturbance as possible to the details of the old work. This is a remarkable little chamber, 35ft. by 16ft., with a painted waggon ceiling, the ribs and interspaces being covered with cognizances and emblems of various families, both regal and private. The structure is very slight, timber-framed, and lined, and was probably the work of Sir Richard Clement, whose arms, with those of his first wife, who

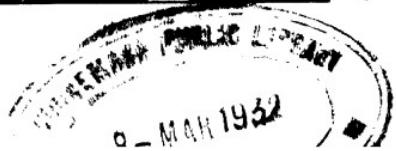
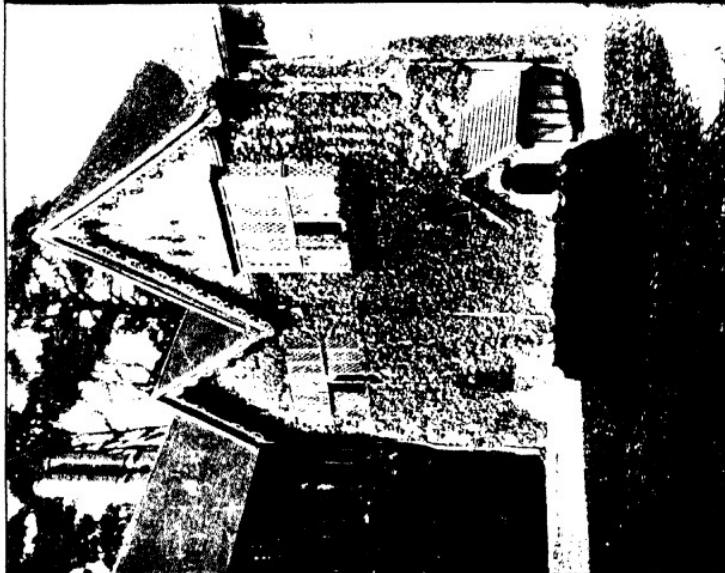
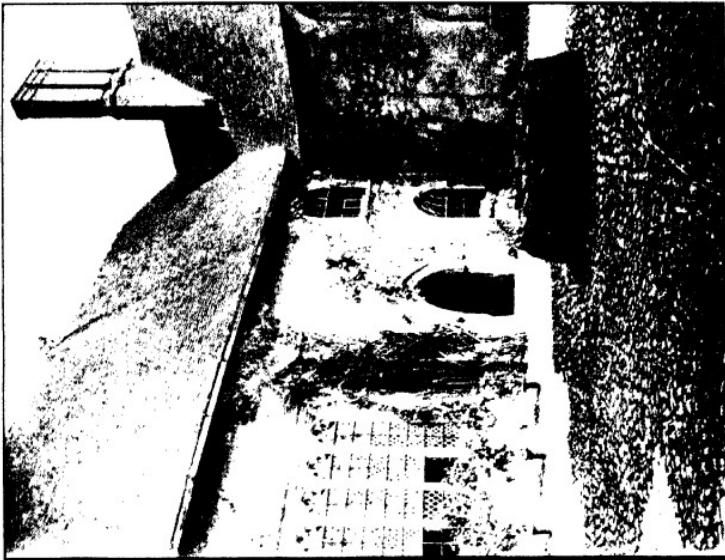
Mr. E. W. Figgins

S. S. C. M.R.

THE COURTYARD, LIGHTHAM MOTTE

N.K. (1931) P.P. 1

Photograph



"died in 1528, occur in several places. It is remarkable how closely "the design of the carved panels of the pulpit correspond with some at "Layer Marney in Essex, *temp.* 1530. Underneath it is a doorway "communicating with a wooden bridge which leads on to the bowling- "green. The side next the quadrangle is carried on oak piers and an "oak arcade enclosing a small conservatory, the piers and arches, etc., "having been recently introduced by a skilful piece of underpinning, in "substitution for the brick piers which formerly supported the chapel.

"This part of the upper floor is probably of the same date as the "chapel, *i.e.*, about 1530, from which it is separated by a priest's room "and a confessional. There are examples of square-headed, mullioned, "and transomed windows in domestic residences of both the fifteenth "and fourteenth centuries, and there seems to be strong grounds for "assuming that these parts of the house were erected about 1450, "possibly by Richard Haut, who was a very considerable person.

"Passing the vestiges of what appears to have been a cloaca over- "hanging the moat near the N.E. angle, we come on the crypt or cellar, "with vaulted ceiling of the usual type of the fourteenth and thirteenth "centuries. It is a small chamber, only 19ft. by 12ft. and 8ft. in "height to the intersection of the ribs, which have plain chamfered "arises and are carried on plain brackets. It is lit by a two-light "Decorated window corresponding to the work of 1340-50. It carries "a room of the same period of architecture, which was the chapel of "that date; but the window is not of the same character as that of the "crypt, and has probably been introduced subsequently: its head has "perished and been replaced by a wood lintel. A Decorated piscina "occurs in the west wall, and in the same wall is a doorway corres- "ponding in style and moulding to the east doorway of the hall below; "it communicated with some other rooms which have since been "altered.

"Contiguous to this chapel are two rooms whose gable ends face the "courtyard to which reference has already been made.

"Adjoining these rooms, and altogether detached from the line of the "moat wall, lies the hall, built about 1340-50, probably by Sir Thomas "Cawne, or Couen, whose finely carved effigy in Caen stone lies under "a Decorated canopy in Ightham Church. This hall is 30ft. by 20ft., "and 35ft. in height; the roof is high pitched, and carried partly by a "pointed stone arch not quite centrally placed, very similar to the "stone arches at Mayfield in the same county, and, to a certain extent, "by curved timber principals at each end. These arches are similarly "moulded, and are supported, each in their own material, by corbels "representing quaint human figures in grotesque postures. The fire- "place is of the fifteenth century, as also is the five-light west window, "and they were probably constructed by Edward Haut about 1486, "though the arms of Sir Richard Clement have been subsequently in- "serted into the glass.

"A very beautiful two-light transomed Decorated window (blocked

"up for many years and only re-opened in 1872) occurs on the east side. "On the outsides of this window, which looks on the back entrance "and east bridge, the pointed heads of these lights have quarter round "and fillet moulding filled in with hollow-moulded cinquefoil tracery, "the three upper foils being broken with ogee countercusps. Enclosed "by and overlying them is an octofoil light of similar description, the "whole being headed by a characteristic dripstone. The inner side is "not moulded, having been simply rebated for shutters in accordance "with the prevailing custom of the period, and a Decorated arch lines "the head of the splayed recess. The hall was formerly entered by a "Decorated doorway direct from the quadrangle, but when it was "panelled by Mr. Norman Shaw in 1872 and reconverted into a dining- "room, a doorway was broken through the east wall into the vestibule, "and the old entrance partitioned off from the hall for the sake of com- "fort. The present kitchen contains a window corresponding almost "precisely with that on the first floor of the tower, and was possibly in- "serted at the same time, *i.e.*, about 1520-30.

"The lower floor of the south front is of the same style as that of the "west front, except the kitchen aforesaid and the small window in the "servants' hall, which corresponds to that in the crypt, but the upper "floor overhangs and is of subsequent date, partly Elizabethan. The "library, another long low room, similar to the morning room, occurs "on this side, the special feature of which is a very beautiful carved "oak chimney-piece, also put up by the late Major Luard Selby.

"The remainder of the house, though interesting, calls for no more "special remark, except to note the outer quadrangle opposite the west "front, of which only the west side, consisting of picturesque sixteenth- "century cottages, now remains."

In addition to the pamphlet by Major-General C. E. Luard, quoted above, which is a reprint of his article in *The Builder* of 15th July, 1893, attention is drawn to papers by Mr. J. Oldrid Scott, F.S.A., in vol. xxiv (1902), and by Mr. Henry Taylor, F.S.A., in vol. xxvii (1905) of *Archæologia Cantiana*, which together form a remarkably comprehensive description of the house. The latter paper is accompanied, among other illustrations, by a beautifully executed bird's-eye view perspective of the entire range of buildings by Miss Drake of Rochester.

EDWIN W. FILKINS.

NOTE.—Ightham Mote is open to the public on Fridays at 3 o'clock on payment of a fee of 6d., which is devoted to local charities.



Mr. J. R. Larkay

Drawings, Inc., Boston

Photograph

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CHAPTER XIII.

TOWN HOUSE.

FACING the main road at the lower entrance to Ightham village stands a good example of mediæval domestic architecture called Town House. It was named "Thrupp's Tenement" in old deeds no longer existing. It may have been the residence of John Thrope (Thrupp?), the baker who took part in Cade's Rebellion (see "Fifteenth Century.") The date "1587" was discovered on one of the gables, but the house is much older. Some stone mullions of windows were found in 1895. An authority has given the date of its erection as about 1480, hence it is not unlikely that it was existing in 1450, the year of the Rebellion. The oldest deeds relating to the house only date back to 1830. At the beginning of the last century it was occupied by two or more families of labourers, the owner in 1835 being a Mr. Selby, a London solicitor (not related to the Mote Selby family), who partly restored it. He failed however to keep it in repair, and it remained more or less a picturesque ruin till it was completely restored by a Mr. Hill, who bought it in 1895.

In the *Gentleman's Magazine* of December, 1835, a description of this house is given over the initials A. J. K., from which I quote:—"The western portion of this building, the piers of the chimney stacks . . . are of stone, neatly coigned. The chimney stacks are of brick, placed diagonally with the line of the walls. The tops of the chimneys are crenellated or embattled The remainder, and larger part of the edifice, is composed of a framing of oak timber, filled up with lath and plaster The pointed gables of the roof are beautifully relieved by weather facings of carved oak. The upper framework of the large bay window, and of the others eastward of the porch, is crenellated, and over one of the windows drops the Tudor label-moulding, which induces me to consider this house as erected about the latter end of the fifteenth century. The windows are divided by numerous mullions, closely arranged. The extent of the front is about 55 feet. The principal apartment was of course that for general domestic assembly at meals denominated the Hall. This has its huge chimney constructed for a wood fire on the hearth. . . . In an apartment adjoining the hall of this ancient dwelling, I observed a chimney front of stone, in the depressed style of pointed arch. A doorway of the same form, on the left of the hall, leads to the cellar. In the sleeping apartments alone, I believe there were no fireplaces, and one peculiarity I noticed, which gave great height and air to the bedchambers, namely, that there was no loft over

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them, but that the ceiling was placed against the rafters of the roof. The massive beams, the dark thick oaken planks of the floors, all denoted a period when great stability and duration were desired . . . ”

When the house was built the windows would probably be latticed either with fine strips of wood or lead, and translucent horn set in instead of glass, the latter being a luxury in those days. About 1600 the use of glass was common, and then no doubt the horn in the windows was taken out in favour of the transparent substance.

J. SCOTT TEMPLE.



Photograph by:

AN INTERIOR, TOWN

R. Lackey



CHAPTER XIV.

IGHTHAM MANOR AND COURT LODGE.

IN the time of Henry III, this Manor was possessed by Hamo de Crevequer who married Matilda de Averanches. His grandson, Robert, next possessed it, and Robert's son, William, dying without issue it passed to Nicholas de Criol, son of Hamo's daughter Eleanor, the wife of Bertram de Criol, Sheriff of Kent. This Nicholas was appointed by Edward I, to be Sheriff of Kent, Warden of the Cinque Ports, and Governor of Rochester Castle. We must pass over the various possessors of this manor for some hundreds of years until we reach the family of the last holders. We may however mention that in 1315 William de Inge junior was granted a license by the king to hold a market in Ightham weekly on Monday, and a yearly fair for three days, during the vigil of SS. Peter and Paul. This fair is now held for one day, on the Wednesday in Witsun week and is known as "Coxcombe Fair."

It is not until 1540 that we meet the name of the late owner, as in that year Sir Robert Willoughby sold the manor to William James. This William James was apparently the builder of the house known as Court Lodge, as on the front of the house is the date 1575. He was the third son of Roger James, alias Hastrecht, son of Jacob von Hastrecht, whose family was originally seated at Cleve, near Utrecht, Holland. Roger James, whose name was corrupted from "Jacobs," settled in London as a brewer, and died in 1591. Camden, Clarenceux King-of-Arms, ratified the arms and crest of the James family on the 18th November, 1611, and the document mentions "William James, of Itam." The name of this family occurs frequently in the Church Registers, the first being that of, "John James, Gent, and Susanne Vandwell, married 24th August 1601."

William James, son of the above-mentioned William, next possessed the Manor. He was a Knight of the Shire for Kent three times in five years, and a member of the Kent Committee for the Sequestration of the Royalist Estates in the time of Cromwell. He befriended Sir Roger Twysden, who had had an Order of Sequestration made out against him. Though James acted against the attempted rising of the Royalists of Kent in July, 1643, yet he more or less ran with the Royalist hare, and hunted with the Cromwellian hounds. By his wife, Jane Miller of Crouch, he had one son, Demetrius, who possessed the Manor. Demetrius married Anne, daughter of an eminent physician, Dr. George Bate. He was knighted by Charles II, and was succeeded by his son, William James, who married Anne, the

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only daughter of Sir Thomas Wyndham, whose family were instrumental in saving the life of Charles II after the battle of Worcester. The eldest son of William James and Anne Wyndham, William James, succeeded to the Manor ; their third son Demetrius was a colonel in the Army. William James married a daughter of Demetrius James of Essex, and was High-Sheriff of Kent in 1732, and Usher of the Black Rod in Ireland at the time of his death in 1780. He left a daughter, who married a Mr. Hindman, and two sons, Richard and Demetrius. Demetrius James became Rector of Ightham Parish in 1773 and died in February 1781. Richard James succeeded his father as Lord of the Manor, and died without issue in Nov. 1817. The Manor now devolved upon Demetrius Grevis, the son of Charles Grevis of Moseley Hall, Worcestershire, and his wife Elizabeth James, the daughter of the before-mentioned Demetrius James, Colonel in the Army. Demetrius Grevis assumed the surname and arms of James, and as Demetrius Grevis-James held the Manor in William IV's time.

The late Col. Demetrius Wyndham Griffiths James, who died in 1902, left no direct heirs.

In 1906 Colonel E. Wyndham Grevis Bailey, nephew of the late Col. James, bought the property and is lord of the manor of Wrotham, Ightham and Stansted, and resides at the Court Lodge.

J. SCOTT TEMPLE.

CHAPTER XV.

ST. CLERE MANOR.

THE first possessor of St. Clere Manor (then called Aldham) of whom there is any record was Sir Thomas de Aldham. He fought under Richard I at the siege of Acre (1191) during the Third Crusade. The manor remained in the possession of his descendants, though little seems to have been known about them.

In the Dering Roll of Arms, temp. Edward I, we find: "Thomas de Eldeham: Azure the sun in his glory or 16 rays."

In the time of Edward III the manor was possessed by Sir Thomas de Aldham. He died without male issue, and his three daughters inherited the estates. One of them married a Newborough of Dorset; another, Margery, married Martin de Peckham; and the third, Isolda, married John St. Clere. The manor was then divided into three portions; the two portions, East or Great Aldham and West or Little Aldham, lying in *Wrotham* parish, going to the two elder daughters, and the third portion, lying in *Ightham* parish, going to Isolda, whose husband, by right of marriage, gave his name to it, and it was called Aldham St. Clere.

John St. Clere was descended from the celebrated family of that name which came over to England with William I. He died before his wife.

Upon the death of Isolda, her son, John St. Clere, succeeded to the estate, and it remained in that family till the reign of Henry VII, when it was sold to Richard Empson, "the grand projector, who had wire-drawn, by his close and dextrous artifices, the treasure of the Kingdom into such subtil threads, that he had almost wound it all into the King's Exchequer." He was the son of a sieve maker, which may account for the wire-drawing, and was a lawyer. Edmund Dudley, his colleague and accomplice, was Speaker of the House of Commons, and both were Barons of the Exchequer. These two men were the able and relentless instruments of Henry VII, and were condemned to death by him, and executed on Tower Hill on the 18th August, 1510. This manor was thereupon confiscated to the Crown. Hasted says that it was alienated from the St. Clere family to Henry Lovell, who left two daughters, Agnes, the wife of John Empson, cousin to the aforesaid Richard Empson, and Elizabeth, the wife of Anthony Windsor. He further states that John Empson conveyed his moiety of it to Sir Thomas Bullen, afterwards Earl of Wiltshire and Ormonde, the father of Henry VIII's wife, Queen Anne Bullen, and that in 1519 Anthony Windsor sold his moiety to Richard Farmer, who in that year purchased of Sir Thomas

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Bullen the other part, and so became possessed of the whole manor. Tradition states that Anne Bullen resided here, and that Henry VIII rode over from Greenwich or Eltham to court her, during her retirement while the divorce proceedings between the King and Queen Katherine were taking place. On the death of Sir Thomas in 1547, the manor was again confiscated to the Crown. It was soon after given to George Multon, J.P., of Multon in Hadlow.

This George Multon was a descendant of "The Lord Dakers of the Northe in the tyme of Edward the seconde," and his great-grandfather, "John Moultone of the Northe," came into Kent in the reign of Edward III, and settled at Otford. George Multon married Agnes or Annys, the natural daughter of "Thomas Pollehill of Shorame," and sister of Robert Polhill of Ightham. He died May 24th, 1588, and was buried at Ightham. His daughter, Jane Multon, married William Lambarde, the celebrated author of the "Perambulation of Kent." He was Bencher of Lincoln's Inn in 1578, and became Deputy Keeper of the Rolls.

Lambarde's "Perambulation of Kent" was completed in 1570, and first published in 1576. A letter written by him to Thomas Wotton is dated from "Seint Cleres this last day of January, 1570," so that it is probable that his book was completed in the Manor House of his brother-in-law. His wife died before him in 1573, and was buried at Ightham. Lambarde died in 1601, and was buried at Greenwich, but his monument was removed to Sevenoaks, where numbers of his family are buried.

George Multon, the son of George before mentioned, who succeeded to the manor, married Audrey, the daughter of Robert Riches of Wrotham; the marriage agreement being dated "the xijijth day of Januarie, in the xvijth yeare of the Reigne of our Soveraigne Ladie Quene Elizabethe." He died in 1618, and was buried at Ightham, leaving the manor to his son, Robert Multon. Robert married Deborah, the daughter of Henry Whetenhall of Peckham. She died in 1619, and her husband in 1644, both being buried at Ightham. Inscribed monuments to the members of the Multon family are to be seen in the church, and the entries in the registers relating to them date from 1570 to 1644.

Before his death, Robert Multon sold the manor to Sir John Sedley or Sydley, who on taking possession had a new house built (which now stands) on the foundations of the old Manor House, the latter presumably having been pulled down on his orders. He was the son of Isaac Sedley, sheriff of Kent in the second year of Charles I, and was, like his near neighbour, Mr. James of Ightham Court, one of the Committee for the Sequestration of Royalist Estates.

The new mansion having been completed, we find that "John Bancroft (sometime Rector of Woodchurch, Bishop of Oxford, and Master of University College, Oxon.) consecrated in the year 1633, by the Primate's license, a chapel in the dwelling house of Sir John Sedley, called St. Cleres, at Ightham, on the 12th of October."

Sir John Sedley left two sons, Sir Isaac Sedley and Sir John Sedley. Sir Isaac succeeded to the manor, and on his death it went to his son, Sir

Charles Sedley, who died without issue in 1702, and was buried at Ightham. He left the manor by will to his uncle, Sir John Sedley, before mentioned, but there appears to have been a dispute concerning it. In the end Sir John waived his rights to the manor as heir-at-law, and an Act of Parliament was obtained settling the estate in trustees.

The trustees sold it to William Evelyn, son of George Evelyn of Nutfield, Surrey.

William Evelyn was Sheriff of Kent in 1723. His first wife was the daughter and heir of William Glanvill, and pursuant to the will of the latter he obtained an Act of Parliament to use the surname and arms of Glanvill. By her he had Frances, who married the Hon. Edward Boscowen, brother of Viscount Falmouth, Admiral of the British Fleet.

His second wife was the daughter of Jones Raymond, and by her he had William Glanvill Evelyn, who succeeded to the manor on his father's death in 1766.

William Glanvill Evelyn was Sheriff of Kent in 1757, and M.P. for Hythe, 1768-1796. He was appointed Captain at Sandgate in 1767. He married, in 1760, Susan Borrett of Shoreham, and died, aged 80, at Bath, on 1st November, 1813.

He left a daughter, Frances, his son, William Evelyn, having died in 1788. Frances married Alexander Hume of Hindley, Surrey, in 1782, and the manor passed into his possession in his wife's right, whereupon he was granted a Royal License to assume the surname and arms of Evelyn.

The late Mr. Edward Boscowen Evelyn sold the manor to Sir Mark Collett, Bart., whose son now possesses it.

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CHAPTER XVI.

WALKS ROUND IGHTHAM

ILLUSTRATING THE RELATION OF THE SCENERY TO THE GEOLOGICAL
FORMATION OF THE DISTRICT.

WALK I.

WE now give some of the walks that may be taken within the Ightham area. The pedestrian had better for this purpose provide himself with the one-inch Ordnance Map; or, better still, with the Geological Survey Map, which shows in colour, bounded by lines, all the Geological Divisions and their extent in the area.

Let him start for his first walk (having the highest point of the Chalk Downs to the north of the village as his objective) from the lowest point, at the bottom of the village street at 273 o.p. He passes over the very narrow alluvial gravel flat of the stream. This widens very soon to the north, where—at Bayshaw—is a dam, either natural or artificial, it is hard to say which, but this may have caused a lake above it in former times, the rush from which may have had something to do with cutting the narrow passage to the south of it. He then soon ascends the steep slope by the Church, all upon the sandy soil of the Folkestone Beds. Blocks of ironstone from these beds have been built into the walls of the Church. The ground continues to rise until the bridge over the railway is reached. Looking over this into the cutting a bed of gravel will be seen capping it. In this gravel Mr. Harrison found some implements. This is one of the patches of the old Shode gravel, and the ground falls steeply from it to the north.

We now pass the old, sombre and, repute says, ghost-haunted mansion of Ightham Court, which has Tudor details, and some most curious moated mounds in the thick wood in the grounds.

At the bottom of the slope we come to the Fen Pond, and to the Gault forming the flat there. Here note the large blocks of Oldbury stone. Some consider that these may be due to glacial transport, but they may be the hard insoluble part of the Folkestone Beds which here pass under the Gault, the softer part of which has been dissolved away.

We now pass for some distance *up* a gradient over the dip slope of the Gault, just as we *descended* the dip slope of the Folkestone Beds from Ightham Court Lodge.

The outcrop of the Gault extends for a mile, and just before we come to the cross-roads we lose the Gault which dips under the Chalk (though the

dip is not visible). Quitting the road and closely examining the surface of the fields—here cultivated—we may see some change in the soil. But all over the surface we shall see a scattering of flints, the Chalk Scarp Drift which obscures the Gault clay.

After passing the cross-roads parallel with the one we are on and touching it on the west, note the deeply cut channel of the old road, very narrow and deep; narrow because it dates back to times before wheeled traffic existed, and deep because the water from the sides of the steep chalk escarpment has collected in and scored it deeper. We shall soon come to the old Pilgrim's Road; and, branching off from this, and from our road, see another old trackway deeply worn and high over-arched with trees and a net-work of roots. This trackway ascends to the crest of the scarp, and is most interesting and silently eloquent of the past. We may see, in the sides of this trackway, a hard ledge, in the chalk cutting, composed of angular pieces of chalk cemented into a hard breccia. This may be traced (according to Sir Joseph Prestwich) to a time when this level marked the bottom of the chalk valley there, whence springs, highly charged with carbonate of lime, cemented the loose chalk into this hardened stone; a striking natural bench-mark of a valley long since cut away, like an old high and dry raised sea-beach.

We now pass, as we continue along the high road which ascends steeply, an old Chalk Pit, too much talused and grown over to show anything clearly. But the marked rise, like a steep step in the road, marks no doubt the hard Melbourne Rock—the junction bed between the Lower and Middle chalk. Still ascending steeply we at last reach the site of Terry's Lodge Pit, on the crest of the plateau and close to the reservoir, at an elevation of 776 feet. Here we have now earned a rest which may well be employed in examining the landscape and the road we have passed along, and how well marked the various parts are by the varying geology.

We will now return by a different route, and from the cross-roads above Terry's Lodge Pit (now no longer open) we turn to the left and to the southwest down a deeply cut and steeply descending road. About half-way down, on the right, is a thick wood. A gate from the road leads to this, and here in the wood may be seen two very good examples of old cultivation terraces, dating back to prehistoric times. Still descending we come to the Pilgrim's Road once more, and going along it, eastwards, for nearly half-a-mile, we come to a road going due south to West Yaldham. Scattered over the fields west of the Lodge Gate will be found a gravel deposit consisting of white angular and sub-angular flints, some very large unworn flints, a few brown stained sub-angular flints, and Tertiary pebbles, and a very few sub-angular fragments of Chert, Ragstone, and Ironstone. Here Mr. Harrison has found a few Palæolithic implements. The high ground, about 430 o.d., on which the gravel stands, marks the watershed of the Darent to the west, and of the Shode to the east, and so is a spot of much interest. At East Yaldham, close by, in the stable yard, are some large blocks of Oldbury stone, and their occurrence there is a matter difficult to account for unless they are the remains of a stone circle, as some think they may be. (See plan of antiquities round Ightham.) A footpath thence takes

us into the valley. We cross this and the railway line, and then reach the gravel patch of Fane Hill where Mr. Harrison has found many Palæolithic implements. Continuing this path we reach Ightham once more, having walked a distance of about five miles.

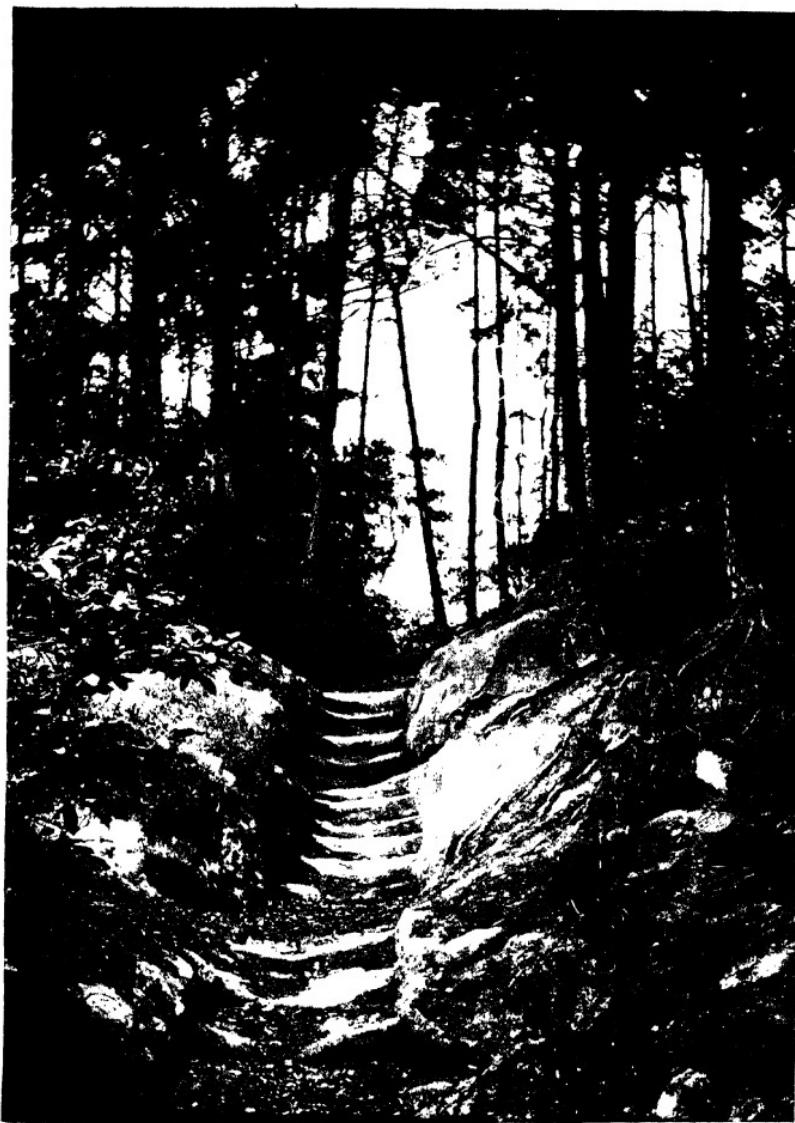
WALK II.

Starting from the bottom of the village, we walk up its steep and quaint street. Just before where the roads fork we come to an old-fashioned grocer's shop front, and notice that one of the windows is filled up with antiquities of various kinds, fire backs, etc., and noticing also some flint implements we at once look at the name, and are, of course, prepared to see that of Harrison.* We now know we are before the residence of—we may say—the hero of this book. So we at once enter, and find that as soon as he understands that we seek to interview him for scientific purposes we receive a hearty welcome. We note that he is a thick-set veteran, full of vigour and intellect, and most interesting in every way. We may find him, perhaps, earnestly gazing on a flint implement; or, maybe, completing a most skilfully and artistically coloured sketch of one; or, serving a customer. Hearing that we wish to plan out a walk he is alert at once, turns quickly round and gets out a sheet of sugar-paper, and very quickly and accurately turns this into a map of the proposed walk; full of instructions of all that we should see. Most likely we are told to visit the Rock-Shelters and the Celtic Camp at Oldbury. We thank him and proceed on our archeo-geological quest with our sugar-paper map as a guide. It may also be a botanical ramble, for Mr. Harrison is well up in the plants of his district, indeed, when anyone in the village, whether gentle or simple, wants any information, they generally come to Mr. Harrison, and usually find what they want.

We wend our way westwards, passing on the right an old and most picturesque wheelwright's shop and house. Then we pass the Sevenoaks turn and go up a steep narrow lane in a deep sand-cutting where we shall have opportunities of seeing a section of the Folkestone Beds. After passing the Schools and more quaint timbered houses and then rising steeply we come to a gorse-covered green, and see, much higher still, a steep spur crowned with Fir Trees, with an almost precipitous face, looking so like a natural fortress, that we think, and rightly, that we must have before us part of the renowned Oldbury Camp, on the scarped and natural north face of which, we are told, we must look out for the jutting crags of the Rock-Shelters, though our Ordnance Map unfortunately gives us no hint of this.

We struggle through the prickly furze and then come suddenly on an old deeply cut trackway, winding along at the foot of the steep spur, now unfortunately enclosed and so become private property, but the key can be had from the owner and access obtained. Untold ages of traffic, foot and horse perhaps, have played their part in excavating it, but heavy rains have helped much to deepen this old pre-historic trackway. About midway we see a most striking beech tree, gnarled and moss-grown, also silver birches,

* Mr. Harrison has now retired from the business but still resides in the house.



Photograph

THE STEPS TO OLDBURY CAMP.

[*Mr. J. R. Larkby*]

ferns, mossy knolls, and the yellow and sweetly scented flowers of the gorse. Altogether we have here a miniature Highland Glen. When we have reached the head of this we stand finally under the beetling crag of the Rock-Shelters. Thence we have a most striking view as we stand with our backs to them, and have at our feet a steep declivity. We look through the boughs of high overarching trees and the effect is extremely beautiful. Through them we see the steep turf-clad sides of the Chalk Downs in the far distance, the mid-distance formed by the Gault vale at their feet, and the foreground is the dip-slope of the Folkestone Beds.

It is now time to turn round and examine the shelters, and note that they are shallow hollows under the stone pent-roof above. This must once have projected much further over, and thus have afforded more shelter than now. Within is a shallow cave, only a few feet deep, and too low to enable anyone to stand upright—and standing before it we may endeavour to draw up what pictures we can of the past.

We must pass on now to further explore the camp, the northern wall of which has been supplied by nature herself—by the sheer drop and steep slope below. But before doing this, let us examine the narrow sharply-jutting spur parallel with that hollow way up which we came. This, we see, shows the white sand, cemented in places by iron oxide into an iron-stone, and ending abruptly at the north in a rounded bluff, while it curves to the east in a sinuous manner. It is in this bluff, with its sharp ridge and the sinuous twist, that some have seen a resemblance to a serpent—the bluff representing the head, and the curve the body—and have thus surmised that here serpent-worship was celebrated. We must leave this for those who have studied the subject. Anyhow it adds something to the interest of the place.

On the western steep side of this ridge is another rock-shelter, the cave partly hollowed in the sand, with a roof of hardened sandstone, but different from the much harder stone of the other. The scene in this direction is also most striking, the fir trees adding a sombre note and deepening the impressiveness of this old-world spot.

We must now pass on, through deep-cut narrow woodland paths, the low whortleberries, with their small but refreshing fruit and scarlet leaves, inviting us ever and anon to pluck them and refresh ourselves. Continuing due south we come in time to a deep ditch and a steep wall, and find that these crown the side of a ravine of great depth, and of great beauty owing to the trees, mostly fir, that so thickly clothe it. The bracken, too, when seen in its autumn glory, adds a deep warm tone to the whole, and once again we are reminded of Scotland.

This camp is one of the largest in England, and therefore seems to point to the existence of a large population here in very early times. It will be noted that the artificial wall and defences commence where the natural wall to the north ceases.

Going due south down an old and narrow road, the continuation of a path from the northern limit of the camp, we come to the high road, and a meeting place of seven ways, and so called “The Seven Wents.”

The eastern one of these soon divides, and we follow the south-easterly branch for a short distance, which leads us into another road. Here we should note the fine tumulus just to the east. Going s.s.e. along this a short way to another cross-road, we come to Rose Wood; passing down the road leading to Ivyhatch Plain, in about a quarter-of-a-mile we can leave the road and enter the wood to the east of it. There we shall find the Neolithic Pit Dwellings (see Chap. VI, p. 43). Having explored these, we resume our walk to Ivyhatch Plain, and take an old road turning off to the west, just before we reach a new house and the high road. We turn up this, and note how narrow and deep cut it is—both evidences of age. This leads us to the summit of Raspit Hill 665 o.d., which looks a natural fortress in itself, and may have been a kind of outpost of Oldbury Camp. This spot is quite as beautiful and as thickly wooded as Oldbury. Continuing along this old trackway for a mile, we finally come to the hard road and the new St. Lawrence's Church. Just below us, before we reach the church, is a large sand-pit in the Folkestone beds, showing a good section some 20ft. thick, and below this is Stone Street. The name Stone Street usually denotes a Roman road. North of the church, the very long deep and picturesque dry valley leading down to Styant's Bottom should be noted.* A footpath by the church leads down this valley to Crown Point and the high road. We can now take the lane leading off northward from the high road to the Broom Inn and Styant's Bottom; and crossing this, come back along a parallel lane leading again to the high road, a little east of Crown Point Inn. This detour gives us a fine view of the valley or gorge of Styant's Bottom, and is full of beauty and interest. Across the valley, and east of the Broom Inn, and visible from it, is a fine sand-pit in the Folkestone beds—remarkable for the brilliant orange, red, and yellow hues of the sand, and when the afternoon sun shines on them the effect is beautiful in the extreme. The lane leading from Chart Farm to Styant's Bottom also shows these brilliantly tinted sands, and is a good example of the deep-cut lanes of sand areas. Just before we reach the high road east of Crown Point, to the west of the other side of the valley, Brick-earth is dug (see Chap. II, p. 16). Where this lane touches the high road, and south of it, is a chain of what must have been fish ponds, though no trace exists of the house to which they were no doubt attached. Having now reached the high road, we can return home to Ightham after our roundabout but most interesting ramble amidst the strongholds and dwelling-places of our ancestors in the long past stone age. The distance traversed will be about six or seven miles, but of course may be made longer by little improvised detours. This route cannot possibly be followed without a map and fairly close attention to it, as the roads are many and bewildering to a stranger.

WALK III.

Going up the village and proceeding south along the Tunbridge road, we turn off to the left just before we reach the Rectory lane. But before

* See page 17—High-level Brickearth.

we do this we should pause and admire the fine view to the north and the commanding site of the church. Going east, along the road to the east of the high road, in about half-a-mile we have a fine view of the Shode valley and gorge. Turning north at the cross roads, we soon come into it and see the quarries, which, alas! sadly mar its former quiet beauty, but for which we must be thankful, as through them was revealed the Ightham Fissure, described by Mr. Abbot in the Appendix. These quarries afford a fine section in the Hythe Beds, showing well the courses of the hard Rag and the soft Hassock, with some well marked undulations in the beds which will well repay careful examination. Having noted this, let us resume our walk down this lovely valley to the Bastead Paper Mill. Here we again have a fine view of the sides of the gorge, the steepness of which is due very much to its having been cut out of the hard Hythe Beds. Here are powerful springs thrown out by the Atherfield Clay below the Hythe Beds. This clay here makes its first appearance, and the springs thrown out by it are indications of its presence. The narrow bottom of the valley is occupied by this clay. This valley, surely enchanting now, must have been doubly so before the paper mills appeared on the scene. However, much beauty and some old-world houses still remain, one in particular close to the rustic bridge. We leave the valley bottom and ascend the steep side, full of varied beauty, and reach Crouch about one mile to the east. Here we turn almost due south, and reach the highest ground at 405 o.d. From Crouch we have a most impressive view of this valley of so mysterious an origin. We ask the reader to turn to the Appendix, where we have made an attempt at a solution of the very interesting problem of that origin. The road going south still ascends gently, and we have continuous views of Oldbury and Raspit Hill to the west, and the valley at our feet, as well as glimpses of the Wealden heights to the south. Coming to the sign-post leading to Old Soar, we go down a steep and narrow road, and soon come to the fortified Manor House with its chapel dating back to the 13th century. It is quite a gem in its way, and well worth a visit. Some eight years ago (in 1898) important boring operations were started to try and reach coal-beds thought to be there, and near enough to be worth working. But after several hundred feet had been pierced, and the bottom of the Weald Clay not reached, operations were abandoned. Little trace of this most interesting attempt to reach coal in Kent now exists. Had it been successful it must have revolutionized the whole county. In a few years time, no doubt, much romance will be woven round the true story of this boring. We can now cross the valley at Dunk's Green and make our way to Ivy Hatch. Thence we may go to the almost world-renowned Ightham Mote House, the oldest part of which dates back to the 13th century. Not only is the house itself most beautiful, but its setting is extremely romantic, situated as it is at the mouth of a deep and well-watered ravine in the Hythe Beds, the stream which feeds the moat results from powerful springs thrown out by the Atherfield Clay, which just crops out in the bottom.

We gain some idea of the steepness of this ravine as we rather painfully

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climb up to Ivy Hatch, thence we have an easy walk down into Ightham over the fine dip-slope of the Folkestone Beds which just come on there.

Truly another most interesting walk—historic rather than pre-historic. The distance covered is about eight miles.

We think now that we have given some very good samples of the walks that can be taken from Ightham as a centre, and to give more in extenso would be tedious.

APPENDIX.

I.

THE OSSIFEROUS FISSURES OF THE VALLEY OF THE SHODE.

By W. J. LEWIS ABBOTT, F.G.S., F.A.I.

My friend, Mr. Bennett, has been good enough to ask me to write a chapter upon the ossiferous fissures of the Shode, and as it has been remarked that the tale of the fauna of N.W. Europe can never be told outside the Ightham fissures, I suppose that any description of this fascinating neighbourhood would be incomplete without a description of them. I therefore gladly accept office. At the same time it is only fair to state that we individually are only responsible for our own remarks and ideas.

No locality has ever furnished us with so much material for the reconstruction of that period of the history of the world during which it has been tenanted by man as the one under consideration.

Four years before the commencement of the working of these fissures, Professor Prestwich brought out his classic text book, in which he gives the total number of vertebrates from the Pleistocene caves and fissures as thirty-seven. But the Ightham fissures have brought the list up to over one hundred species! Nor is the invertebrate list very much less interesting, opening up, as it does, so many problems of great importance in connection with present day non-marine mollusca, and the nature and origin of the remarkable subterranean storehouses.

It must, however, be pointed out before I begin, that I have a very large mass of material which still awaits final working, and this embraces life of every description. I have, probably, 20,000 relics which still have to be further dealt with, most of them, it is true, call for but little further special working out: a blessing unfortunately not enjoyed by the rest.

The origin and history of the Ightham fissures is so intimately associated, not only with the present day physical features of the district under consideration, but with the entire Tertiary history of N.W. Europe, that it is impossible to do justice to the subject in the small space my friend, Mr. Bennett, is able to allow me in his volume. I must, therefore, refer my readers to the papers upon this subject in the Q. J. G. S., vol. L, and the Trans. S. E. Union Sci. Soc., 1897, p. 26. In the latter, and also in *Sunny Days in Hastings and St. Leonards*, and *Salmon's Guide to Sevenoaks*, I

briefly outline the great earth movements which have taken place in S.E. England, giving the origin of some of the various deposits which occur in the district under consideration, and in the former I deal more especially with those inseparably connected with the Shode fissures; diagrams are also given showing that a great down-throw has occurred, approximately from Plaxtol in a N.N.W. direction to below St. Clare, amounting at the former place to over 500 feet. To this depression the clays lent themselves by forward progression at right angles to the line of depression, by which the outcrop of the gault in the area under consideration is nearly doubled; the loose sands of the Folkestone Beds similarly accommodating themselves to circumstances. But the limestones of the Hythe Beds being unable to do this, naturally fissured. The whole of the district is thus permeated with cracks of all sizes, more or less at right angles to the line of this down-throw. Sometimes they open upon the surface, and become choked up with surface-derived materials, without a sign of a fossil. At others they do not become so filled, and remain as "empty vents": while yet again at times they are so favourably situated in relation to a subsequent stream, that the waters, having free access to them, carry into them their usual burdens and there deposit them.

At this point I would like to call especial attention to the land-and-life relics usually borne by a stream. I fear very few realise this phenomena! I should, therefore, advise a walk at low tide along the river shore, say from Grays seawards. Here can be seen thousands of relics of the life of to-day, bones of animals, domestic and wild, not only aquatic mollusca, but the essentially terrestrial forms: every kind of tree and plant, fruits and leaves and works of man of practically every description! indeed it would be quite possible to write "a history of our own times" from this flotsam and jetsam. And as a contrast to this I might say I have often walked hundreds of miles over the surface of fields and uncultivated places, looking at every object on the ground, searching for the relics of recent animals, without finding a single one.

Sometimes the height to which the fissure-material rises in the fissure marks the height to which flood waters were able to carry their burdens, and in the subsequent ages the meteoric waters gaining an access to these chambers, carried with them the lime dissolved from the limestone above, or, alas, from the bones and shells; and re-deposited it in the upper interstices of the fissure material, until at last it became solidified, and then received the final sealing down of stalagmite, which protected the bones below from further attack. There are now some ten fissures showing in the quarry under notice, but only one of them was really sealed down with stalagmite, and this has supplied almost all the relics. Two others were partially sealed and have contributed some interesting things.

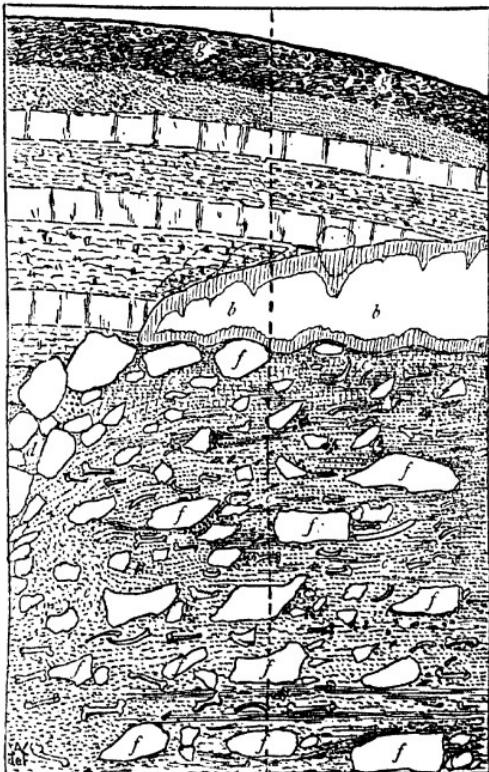
Reverting once more to the Shode itself, we may point out that the stream now rises on the lower part of the chalk escarpment, about one-and-a-half miles above Ightham, passing through the picturesque village over the Folkestone Beds in a general S. and S.E. direction, and after receiving a westerly branch, pierces the Hythe Beds in a gorge some 80 feet deep.



COLLECTIVE VIEWS OF THE GRAYHAWK FOSSIL BEDS AS THEY APPEAR IN THE
PINE MOUNTAINS - ONE OF THE BIGGEST BLOCKS IS SEEN IN THE CENTER, ADJACENT TO THE TOP.



Evidence of the resistance offered by the hard limestone is evinced in the huge old lake-like expansion at this spot which must have existed through all its history. Within a quarter-of-a-mile or so of this the Shode receives a tributary coming down from Borough Green, which has also cut a deep gorge-like valley, upon whose sides were to be seen a loam or sandy brick-earth, in every way similar to that which entered the fissure opening upon its banks, as well as similar bones and shells. In about another quarter-of-a-mile the Shode receives another branch from the N.E., which also cuts its own channel, and by the approach of these small tributaries to each other, and the rise of the greensand escarpment, the little promontory becomes entirely isolated. In some districts, doubtless, fissures have been filled from the surface, and as animals died they were taken in from above, along the line of water drainage: But this could not possibly obtain here. This little quarter-of-a-mile of land could not support these creatures, moreover by the position of the fissures in relation to the rising of the counterscarp and the main stream, there really is only a few yards upon which the creatures would have had to come to die; and surface drainage and creep would then have taken them *from* the fissure instead of into it. But why they should have climbed these heights throughout the life of the fissure to offer their bodies to this subterranean Moloch is a riddle, the solution of which I will leave to those who consider the contents of the fissure were introduced from above. I have seen numerous longitudinal sections of these fissures of great extent, owing to their forming the limit of the working of the quarry: and if ever any one thing was shown by a section, it was that these fissures were filled from the tributary of the Shode. There are other fissures which have been filled from the top, and are quite distinct from the stal-



GENERALIZED VERTICAL SECTION ALONG FISSURE (1892).

The dotted line shows the face of the quarry in 1894.

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agmititic and stalactitic fissure to which I am confining my remarks. Sometimes the fissures lower down the valley also contain bones, especially those of the larger animals: one yielded a perfect skeleton of a rather large wolf. But smaller bones were also sometimes found. Although the whole of the district for eighty square miles is permeated with fissures, it is only in those that are fortuitously situated in relation to an ancient stream that I have found bones.

Perhaps the greatest proof of the filling in of the fissure by the stream was furnished by the keyed blocks as illustrated in Q. J. G. S. above referred to, and in the accompanying plate. These blocks appeared at all heights of the fissure and were nipped in tightly by its walls. These masses must have fallen into this position at the original opening of the crack. As the fissure became filled from their face the coarser stones and bones were stopped in front of them, and only the smaller material carried through the apertures to behind. After the material had reached the top of the keyed block, the heterogeneous fissure-filling would be evenly deposited again, and this very often in absolutely dead water level strata. This was particularly shown with the thin beds of clay brought down from the gault (which does not occur on the land above the fissure), and by the adhesion to the walls of the fissure of the stems of the chara brought down from the gault ponds to the north.

Both as regards the thin beds of clay, and the general composition of a sandy marly matrix, with boulders of all sizes, from angular pieces a quarter of an inch in diameter up to pieces which it would be difficult for water to move, of rag, and of chert, ironstone, and Ightham stone, attaining less dimensions than the larger rag, and ordinary flints, with fossil bones and shells, the fissure material was identical with that of the valley of the Shode tributary.

It must be borne in mind that at no period could it have been a very long stream, and as even the parent stream to this day carries but very few if any fluviatile mollusca, probably this supported none, which will account for the almost entire absence of truly aquatic mollusca from the fissure.

We need not, therefore, be surprised at the prevalence of land mollusca, what we must, indeed, all be surprised at is the vast amount of materials which have laid so long and been preserved so magnificently in these subterranean museums of nature, some of which we will now proceed to notice.

PLANTÆ.

Chara.—For many theoretical reasons perhaps the most interesting plant found was *Chara*. As this is a water plant, and no doubt flourished in the Gault ponds, whose overflows were received by the stream I consider responsible for the filling in of the Ightham fissures. The stems of this plant were in a state of calcic casts, and were often present in immense numbers, and often followed the level bedding of the fissure material and adhered in parallel lines upon the fissure walls. Very frequently large quantities of

pure re-deposited Gault clay occurred associated with these. There can be no doubt of the nature of these things, as not only have the casts of the stems been found, but the spiral structure of the nucules has been noticed, and the stems retained sufficient of their structure to show they belonged to *Chara* and not *Nitella*.

Mosses.—There were scores of traces of mosses, of which one species was determined by my friend, Mr. E. M. Holmes, F.L.S., as *Hypnum praelongum*. There are doubtless other genera represented and certainly other species.

Nuts.—The nuts opened up very many important questions. Firstly there were large specimens, which local lore has it were introduced into the county by one Cobb in the reign of George III. I fear, however, that much as that good gentleman might have done to improve the local nut in his day, the original material was not so very far behind at least present day productions. The next thing that interested me was the way the nuts had been gnawed, as from this I was able to suspect the presence of lemmings before I actually discovered their bones. Of this we are quite certain that *Corylus alvellana* was growing in the neighbourhood then as now.

Qurcus robur.—Acorns were fairly plentiful. Sometimes the insides would be represented by a black spongy carbonaceous cast, a state only very rarely reached by the outside hard skins, which generally remained, though in a segmented condition.

I have still a lot of vegetable material to work out.

INSECTA.

Galls.—I experienced a great interest in the discovery of some hundreds of little tiny black globular bodies from .75 to 1 millim. in diameter, in ones, twos, and threes, or sometimes more. They were like, yet unlike, seeds. Ultimately these turned out to be *Cynips*.

Amongst the other insects might be noted *Porcella Scaber*, and species of *Zulus*, *Otiorkynchus*, and *Chrysomela*. Other species and genera are also represented.

OSTRACODA.

Candonia Candida.—The tiny little water fleas were also carried into these fissures at times, as the presence of *Candonia candida* shows.

This is a very small unimportant little creature, but it speaks with an unsilenceable voice upon the manner in which the fissures were filled, for had they been filled from the dry land above, it is certain no ostracoda would have been found amongst the relics of a former land surface. On the other hand, had the fissures been filled by the stream at the side ostracoda would have been in their natural position.

MOLLUSCA.

The mollusca yielded by the fissures are of very special interest, and may be considered as consisting of six natural groups. (1) Those which are

now apparently extinct in this country; (2) those which have come up from the Pliocenes; (3) those which have been found in Pleistocene drifts; (4) those already recovered from caves; (5) those that are new to Britain; and (6) those that are new to Pleistocene but are known from deposits of later age.

In the first group we get that remarkable fossil, *Hygromia umbrosa* *Partsch*, which is quite new to British Pleistocenes, but is known from beds of that age at Leuben near Lommatzsch, and Robschütz near Dresden and Weimar. It has also lived on in Southern Germany, Bohemia, Switzerland, Silesia, the Carpathians, and in Denmark. In all some half dozen specimens of this species were found, of which two were immature individuals. This is undoubtedly one of the most interesting Pleistocene Molluscan discoveries.

To the next group, viz., those which have come up from the older Pliocenes, belongs no less than eight species (and possibly more), these are:—

Hygromia hispida, from the Cromer Forest Bed, and both Norwich and Red Crag.

Vallonia pulchella, from deposits of the same ages, and probably from even still older.

Helicigona arbustorum, from Forest Bed, Weybourne, Norwich, and Red Crag.

Helix nemoralis, from the Red Crag and Forest Bed.

Jaminia (Pupa) muscorum, from the Forest Bed, Norwich, and Red Crags.

Cochlicopa lubrica, from the Red Crag.

Succinea oblonga, from the Forest Bed, Weybourne, and Norwich Crags.

Carychium minimum, from the Forest Bed? and Norwich Crags.

We thus see that over 28 per cent. of the species found are Pliocene forms, a very important fact to which we will return again directly.

We next come to the group consisting of species that have already been recorded from Pleistocene river deposits.

It will be seen on reference to the table which follows that practically all the species found occur also in Pleistocene river deposits, the one exception being *Vitrea alliaria*. But as this has since been recognised by my indefatigable friends, Messrs. B. B. Woodward and H. S. Kennard, in material from the Happaway Cave, we may say that, firstly, practically the whole of the species of Mollusca of the Ightham fissures are found in river deposits, and secondly, they are all found in deposits of Pleistocene age. At one time, from some unaccountable reason, it was suggested that from the occurrence of so many Holocene forms, which were new to the Pleistocene, the contents of the fissure were either modern or mixed. But there was never any justification for such an idea; there was the one isolated case of *Vitrea alliaria*, since discovered in Happaway Cave, every other species has been found in well-known Pleistocene river deposits. By percentages we may say that there was never more than three per cent. of the modern element, while upon the same ground there was over twenty-eight per cent. of actual Pliocene forms, or over ten times the justification to call the

fissures Pliocene than there was to miscall them Modern. The discoveries since made, and notified in the remarks column, show us the danger of building upon negative evidence alone.

The next group, though small, is exceedingly interesting, as at the time of the discovery of the Ightham fissures, practically nothing was known of the Cave Mollusca. In this we note which of the species have been found, as yet, in caves and fissures.* It has been stated that the Ightham fissures-working rang out the old pickaxe workman and rang in the gospel of the graduated sieves, microscope, and student. Let us hope this is so. I can confidently say that absolutely hundreds of tons of material passed through my hands and the graduated sieves, and quantities almost as unrealisable passed over the stage of the specially-constructed microscope. While thousands of specimens had to be dressed quite a number of times before they could be moved. At one time, when the quarry was not being worked back fast enough to keep pace with the enthusiasm engendered by the contents of the fissure, I had to work into the face of the quarry for twenty or thirty feet in an opening which was perfectly dark, and at times scarcely wide enough to force one's way into, and when the only way to work was to lie flat upon one's stomach upon the damp cave earth, crawling over and under the keyed stones, and work, not knowing whether at any moment I might not bring down sufficient loose cave earth to bury me, or go through into the unknown depths below; in any case I was far removed from all help. As I look at the unique collection of treasures these fissures were made to disgorge, and reflect upon the secrets of nature they had to disclose, I cannot but feel they were worth taking one's life in one's hands for, and the pain suffered from repeated attacks of internal inflammation are all forgotten, from contrast with the delight of once more recovering from the jaws of death, and having the material brought up and put upon the bed. I am also delighted to know that the same method of working has been applied since with such important results. I know nothing that has made me feel so sad as the sight of the magnificent material, which I have seen in the hands of different people who have visited the dump-heaps of our classic caves: interesting Mollusca, magnificent little jaws and bones of unrecorded species, and from the depths of stalagmatised caves the small bones of man himself.

Of the Mollusca, the *Helicedæ* call for the first remarks, *Hygromia umbrosa* *Partsch.*† being a species new both to the Pleistocene and Britain. It was the first case, at any rate in recent years, of an unrecorded continental form appearing in this country; it has since been paired, or even excelled, by the remarkable Miocene *Neritena* which has been found in such myriads at Greenhythe. The genus *Helix* here presents us with a

* At the time of reading the first paper there were several chronological offenders, but all these are now known to occur in Pleistocene river deposits, with the exception of *Vitrea allisaria*, but as this has also since been recognised by my friends, Messrs. Kennard and Woodward, in the Happaway Cavern material, the last offender has been removed.

† Figured and described by Messrs. A. S. Kennard and B. B. Woodward, Pro. Mal. Soc., vol. II, p. 6.

quantity of invaluable material, characteristic examples of both *nemoralis* and *hortensis* occurring in quantities; but to add complexity, we got forms of typical hortensine outlines and sizes, with the characteristic nemoralian lips. Upon the whole *nemoralis* was larger than to-day and more depressed, calling to mind the present-day large varieties one sometimes sees upon the continent. There were, however, great differences in the relation of height of the spire to the diameter of shell, many being quite as elevated as present-day forms, 24mm. by 20mm. being a very common form. Boiling the shells in gelatine restored the colour in a marvellous manner, the bands becoming as pronounced as in a living animal, but of the ground colour one cannot be sure, it might have been a yellow or it might have been a white, there is no sign of yellow to-day, even under the overspreading inner lip; it is, therefore, difficult to say whether the now white ones were albino varieties or forbears of the present-day var. *libellula*, and this would also apply to the ground colour of the banded varieties. Of those I found myself, and some subsequently sent me by my friend, Mr. A. S. Kennard, fifty-six per cent. were of the band formula 12345. Of these, in nearly every case, the bands decreased very regularly from below upward. (12).345 claiming five per cent.; 12340 one per cent., a proportion also reached by both (12) 3 (45) and 00040. The one banded variety, oo 300, were represented by fourteen per cent., and the albino or might-have-been unicouleur varieties by twenty-one per cent. One or two specimens certainly still strongly suggest the chocolate *Castena* or red *rubella*. In all the young specimens the umbilicus was open, a feature sometimes maintained in the adult examples, and the outer lip was always thick and strongly coloured. In *H. hortensis*, honours were about equally divided between the albino and the normal five-banded varieties. I did not see a single departure from this. They were all of a fair medium size.

There were others which partook of the outline and characters of both *nemoralis* and *hortensis*, sometimes with well coloured lips, at others with scarcely any colour trace. But in addition there were others which while they partook of features of one or both of these, nevertheless differed from them much more than they resembled either, suggesting new species.

There is a number of the Mollusca about which remarks might profitably be made, I will, however, only refer to three of them. *Carychium minimum* was represented by a special form I had also found at the Pleistocene Admiralty section associated with *Betula nana*. My friends, Messrs. Kennard and Woodward, in their paper, *op. cit.*, have described and figured this gracile variety as being "more slender in form, not exceeding .75mm. in width, being quite 2mm. in height. The whorls are six in number, more closely coiled, and consequently longer, and increase more gradually all through. So that the spire is higher and more tapering. The body-whorl is much less in proportion. The mouth is more rounded and not constricted at the outer tooth: on the other hand, the tooth itself is greatly reduced, and is represented by a mere thickening of the labrum. The columella teeth are not more than one-third the size of those in recent examples, and occur far back inside the whorl, so as to be invisible when

the shell is viewed obliquely. The peristome is more reflected and less thickened." *Vertigo minutissima* was of gigantic size as compared with recent examples. Numerous molluscan eggs were also found.

Before quitting the mollusca, I would like to make a few remarks in relation to comparison with these and those from a neighbouring hill wash. It has been claimed that the contents of the fissures were derived from the hill above, and washed into the fissure from above. That such fossiliferous hill-washes do exist is well known, although they appear to have been generally looked over till I first called attention to them upon the North Downs. If these two deposits were of similar age and origin there would be a close relation between the two, but as a matter of fact there is practically none whatever that would minimise the Pleistocene age claimed for the contents of the fissure.

VERTEBRATA.

Despite the interest which the lower forms of life may possess for the general biologist or the specialist, it is the larger vertebrates—the huge woolly mammoths and rhinoceroses, the ferocious hyænas, the northern reindeer, arctic fox, lemmings, and other creatures, either now extinct or confined to glaciated regions—that suggest to the mind of the general reader conditions so absolutely different from those now obtaining in the district. We will, therefore, now turn our attention to these.

Appended to this article is a synopsis of the vertebrata, and these fall into the same natural divisions as the mollusca. It is true a further column indicative of the present range of those that are still left upon the planet would, of course, have been useful, but these facts can be included in the general remarks we will now make upon the species.

Rana temporaria.—Common Frog. The common frog is an inheritance from the Cromer Forest Bed, and, since its first appearance, has spread over the greater part of Europe and to Asia, reaching altitudes of 10,000 feet. The bones of this species occurred in hundreds, probably there were other allied species, as the bones can readily be divided up into series presenting great differences.

Rana esculens.—Edible Frog. Among the various sets of batrachian bones, there are some which are so exactly like those of *R. esculens*, and unlike other bones of approximately the same size of other species, that I have no doubt about the presence of this species. It also occurs in the Forest Bed.

Bufo vulgaris.—Common Toad. Despite the fact that the toad and frog are so dissimilar, there are only certain of their bones that are easily separable, but all the characteristic bones are here in large numbers, showing the presence of the toad. The species is known from the Forest Bed. Frogs and toads are both known from rocks of Eocene age. *B. vulgaris* is capable of standing great extremes of climate, and to-day is found at all altitudes up to 7,000 feet.

Molga.—Newts. Probably two or even three species of newts were present. The genus is aquatic, and individuals hibernate in the winter, when

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they are sometimes enclosed in the ice, but revive upon liberation from their crystal prison. Newts are found at great heights in mountain tarns.

Lizard.—Bones of a species of lizard were found, probably *ootica vivipera*.

Anguis fragilis—Slow Worm. Thousands of the scales and hundreds of the bones of this interesting little limbless lizard were found, together with many scores of its vertebrae, skull-bones and jaws, many of which indicate creatures of very large size. Despite cruel persecution it has spread itself over the greater part of Europe and Western Asia, ascending beyond the snow-line, sometimes up to altitudes of 7,000 feet. The delicate little sculptured scales of this creature often adhered to the sides of the fissure for yards, marking former water levels.

Tropidonotus natrix—Snake. Bones of this creature also existed in hundreds, many of the vertebrae were very large, suggesting a creature nearly four feet long; the jaws and skulls also point to powerful specimens.

Pelias (vipera) berus—Viper. Characteristic jaws, vertebrae, etc., of this creature were found in great numbers. It appeared in Britain for the first time in its migrations from the south in the Forest Bed period, but, like the foregoing, never reached Ireland, which points more to the probability of the isolation of that island before this period, than to St. Patrick having banished them, and afterwards setting a band of fossil-hunters to destroy all their buried bones. It now lives in high northern latitudes up to altitudes of 9,000 feet.

BIRDS.

We now come to our native songsters, which here appear for the first time. It is true that in but very few cases the bones are *exactly* similar in every little detail to those of modern species which nearest approach them, and with which my learned colleague, E. T. Newton, F.R.S., has associated them. Indeed there is usually a marked difference. Two courses were open, either to make a new species of each, or to provisionally place each set of bones to the credit of the living species to which it approximates most closely. We have selected the latter course, as it is only natural that old Father Time, whose fingers we know have been so busy in the past in moulding true birds through all their stages from Reptilian ancestors, however slowly, is still at work. Amongst these chanters of the air are: *Tundus musicus*, song thrush, since found in south-west England, Cave., and *T. merula*, blackbird; *Accentor modularis*, hedge-sparrow; *Alauda arvensis*, skylark; *Anthus pratensis*, titlark; *Fringella cælebs*, chaffinch. While amongst the waterside or woodside choristers were *Motacilla*, wagtail; *Lanius collurio*, black-backed shrike, with the present-day ubiquitous common sparrow, *Passer domesticus*, and a visitor from the south in the form of the swallow, *Hirundo rustica*. Briny-loving beauties were represented probably by the gulls, *Larus*, creatures found in both river deposits and caves, and the far more formidable *Buteo*, buzzard, with the peregrine falcon, *Falco peregrinus*. The ducks and geese were well represented: of the former there were a great many bones, and in

these we meet with an old friend from the Forest Bed in *Anas boscas*. It is also found in river deposits and caves. There were bones of another species larger than *Spatula clypeata* and smaller than *A. boscas*. It is also exceedingly interesting to find here another old friend of the Forest Bed, the shoveller duck, *Spatula clypeata*, although it has not been found in either river drifts or caves. Geese are represented by *Anser cineras*, the grey goose, and another species of smaller size, accompanied by the more arctic *Cedemia nigra*, the common scoter, and *Rallus aquaticus*, the water rail.

INSECTIVORA.

Talpa Europaea—Mole. The well-known grub-miner was here in immense numbers. It had been recorded from the Forest Bed, when it was accompanied by a near relative, since become extinct. The genus is also well-known from the Lower Miocene of Europe. It is a most interesting creature, and presents us with the greatest modification of bones, consequent upon mode of obtaining food, of any of the mammalia, from the rest of which it presents the greatest deviation of type. As another injustice to Ireland, it does not extend to the Emerald Isle, nor is it entirely gracious to Scotland, seeing it does not reach the north of that country, although it favours Siberia with the rest of Europe.

Sorex vulgaris.—Common Shrew existed in large numbers, skulls, jaws, and every other bone. These presented a great diversity of form, especially the pelvic bones, and in the coloration of the teeth, which in this genus differ from those structures in anything else, being put upon and over the jaw rather than arising from alveoli in the ordinary way. *S. vulgaris* has been recorded from the Forest Bed, and from river and cave deposits.

Sorex pygmaeus.—The pigmy shrew is a case of a small creature with a long life-range, as it occurs with its relative in the Forest Bed and caves.

Neomys (=crossopus) foidens.—Water Shrew. Several jaws occurred with the characteristic incisor formula, with only the veriest tinge of colour at the apices of the cusps, invisible to the naked eye. Modified pelvic bones also suggest difference of habit. There were other jaws with absolutely white teeth, suggestive of other genera.

BATS.

Bats occurred in immense numbers, they include every bone down to those as fine as hairs, and are probably the most delicate things ever found fossil. Amongst the genus *Vespertilio* we have some half dozen or more species: *Scotophilis pipistrella*, *Plecotus auritus*—the long-eared bat, and three or four species near to it. Unfortunately bats do not appear to have been recorded from Pleistocene river drifts, although I have seen their bones from both drifts and caves, and the order is known from beds of Eocene age, and perhaps older.

Lepus Europeanus.—The European hare was well represented by numerous examples of practically all its bones.

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Lepus variabilis, or Snow Hare, was also well represented; both these forms have been found in river drifts and caves, and although the latter species does not now occur in England, it is still found in Scotland, where both species exist, but in Ireland and further north the snow hare replaces the European species.

Lepus deluvianus—Giant Hare. There was a hare of giant proportions originally described by Sandford. Numerous bones were found here pointing to an animal which, judging from comparison with a twelve pound European hare, must have weighed some eighteen pounds, and have been the same as Sandford's creature.

Lepus cuniculus—Rabbit. Although this creature appears to have eluded the search of the geologist for a long time, since its discovery in these fissures it has been found in river drifts and caves of Pleistocene age.

Octona (=Lagomys) pusillus—Pika or Tailless Hare. This curious little creature was also found in the Ightham fissure. A very perfect jaw agrees so closely with the living Siberian form as to render it fairly certain that Owen would have been safer in classing the specimens from other caves as *pusillus* instead of assigning them to a new species, *L. spelæus*. It has also been found in the Forest Bed and river drifts.

Spermophilus Erythrogenoides.—The Erith Marmot was fairly well represented. I obtained some dozen jaws and a fair quantity of limb bones, while my friends, Messrs. Kennard and Corner, found a magnificent skull. Doubtless more than one species is represented. We are all longing for the time when all Pleistocene vertebrates will be dealt with in that thorough manner the Mollusca have been by my esteemed friends Messrs. B. B. Woodward and Kennard. Despite the magnificent work which my esteemed colleague, E. T. Newton, has done, every species ought to go through the same authorities' hands *de novo*. We should then see which names have to be deleted from old lists and which have to be added.

Mus sylvaticus—Long-tailed Field Mouse. Remains of this species were quite plentiful, skulls, jaws, and bones of every description. It is a relic of the Forest Bed, and now is found as far north as Siberia.

Mus Lewisi (=Abbotti)—Lewis-Abbott's Mouse. My esteemed colleague, E. T. Newton, was good enough to name this species after me, forgetting that a modern species had also been christened with that name; it therefore became necessary to rename it. I should have preferred it to have been *Ighthamensis*, but my friend preferred my name being associated with it, and therefore renamed it *Lewisi*, a kindness for which I am greatly indebted to him. The creature was larger than *M. sylvaticus*, shorter nosed, broader headed, and the teeth present distinct differences from that species. but apart from the teeth the jaws, even without the teeth, are easily distinguishable, and amongst the thousands of small rodent limb bones I have unnamed are the bones of this creature, which are amongst those to differ from already well-known forms.

Mus minutus—Harvest Mouse. There are a score or more well ossified mature bones of musine type which must have belonged to some tiny little

mouse, which my esteemed colleague associates with the harvest mouse, but where the little creature built his charming nest in those days so long anterior to cornfields is yet to be discovered.

Lemmus (=myodes) lemmus—Norwegian Lemming. The remains of this species were fairly plentiful, skulls, jaws, and every other bone. It was here in the Forest Bed period and possibly before, at anyrate the good time it enjoyed here left such favourable impressions upon it as to recur in the race as an instinct, which urges myriads of individuals to return to the land of their forefathers, without a guiding star, or perish in the attempt. It now lives in the colder regions of the north.

Dicrostonyx (=myodes) torquatus—Arctic Lemming. The still more arctic relative of the foregoing was here in those times when it appears to have first made its appearance. It has, however, been found in other caves and in river deposits, although quite extinct in this country before the Neolithic age. It now thrives in the arctic regions of both hemispheres. Beautiful skulls and jaws and numerous limb bones of the species were recovered.

Evotomys (=microtus) glariolus—Bank Vole. This species was here in good numbers, and was an inheritance from the Cromer Forest Bed.

Microtus amphibius—Water Vole. This other Forest Bed species was here in immense quantities. Beautiful skulls, so perfect that they could not have been moved far, often with their jaws and other bones either in position or nearly so, clearly pointing to the fact that they had been brought in by the waters of the responsible stream. Water voles are never found on high dry promontories away from water. It is probably the same species as is found in the Forest Bed, but the genus is known from the Red Crag.

Microtus arvalis—European Vole. Skulls, jaws, and bones of this form were found in fair profusion. It is also known from the Forest Bed, and although extinct in Britain, is found throughout Europe to the Steppes of Siberia, ascending to heights of 6,000 feet.

Microtus agrestis—Field Vole. The field vole appears to have made his debut about this time, and although also found in caves and drifts, was not one-third as plentiful as some of the other voles. It now extends to high northern latitudes.

Microtus rutilus—Northern Vole. We have here another old friend from the Forest Bed horizon, and one also recorded from other Pleistocene deposits, both cave and river. It is extinct in Britain, but exists throughout northern Europe and a large part of Siberia. It was fairly plentiful in the fissure, more so than the last named.

Microtus gregalis—Siberian Vole. This was a fairly plentiful species, some hundred jaws being recovered and some thirty really good skulls. It is another example of a Forest Bed species which became extinct in this country in Pleistocene times. It now inherits the barren regions on the Obi Siberia.

Microtus nivalis—Alpine Snow Vole. We come now to one of the most remarkable cold-enduring creatures known, which made its appearance in this country at this time. It did not survive the Pleistocene period here,

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and is now known only from the high Alps and Pyrenees, where it lives at altitudes of from 2,000 feet, up to and beyond the line of perpetual snow, so that for nine or ten months of the year it exists absolutely under the snow ; conditions under which, I believe, no other creature is able to sustain life. It was a sleek little animal, with pointed features, rather large ears, and a tail about as long as its body, the entire length totalling up to six or seven inches.

Elephas primagenius—The Mammoth. This “woolly” monster is too well known to require even a few lines of description. It is an extinct species of elephant of huge dimensions, whose glory shone to its height in the Pleistocene period. An allied, though probably not identical, species occurs in the Forest Bed, and to-day the Indian elephant may be a lineal descendant, though greatly modified, of this creature. At West Thurnock I had the delight of unearthing the entire skeleton of one of these creatures, which had fallen over the chalk cliff into the mud below. Whole carcases have been recovered from the almost eternal ice of Siberia. Several unmistakable bones of this animal, as well as large ribs and large pieces of limb bones, were found in the fissures. Of late years, Dr. Andrews and others have made most magnificent researches into the evolution of the elephant.

Equus caballus—Horse. Bones belonging to either two species or two varieties of horse were found, one quite a large species the other small. Horses are found in the Forest Bed and in nearly all river and cave deposits.

Rhinoceros antiquitatus—“Woolly” Rhinoceros. Teeth of both upper and lower jaws, hyaena-gnawed limb-bones, and bones showing denuding action or corrosion, were also found ; some of the sharp fractured bones show they could not have travelled far. This cold-enduring creature, like the Mammoth, has also been found in the “eternal” ice of Siberia, otherwise it is confined to river and cave deposits, the main stream—the Medway—furnishing great quantities of its remains. It is essentially a Pleistocene species.

Cervus Elaphus—Red Deer. The monarch of the glen, born in the Age of Deer, as the Forest Bed has sometimes been called, was also found, when it attained a size not reached to-day, bones indicating a very large creature being found, as well as a jaw and other bones of smaller size. Although still inhabiting temperate Europe, it is also found in the greater part of Siberia.

Rangifer (=Cervus) tarandus—Reindeer. A picture of England under ice and snow would not be complete without the reindeer, which forms so characteristic a feature in a Lapland landscape—or icescape. Of this creature we had lots of relics, larger parts of upper and lower jaws, limb bones, scapulae, and others. There were two very interesting features about some of these bones, firstly, like very many hundreds of others, they had lain in the bank of the stream and become eternally peat stained, although they were freshly broken and sharp, and could not have travelled very far (a condition they could not have acquired by lying on the limestone

promontory above the fissure); and the other case was that of a leg bone which had been undoubtedly gnawed by man, who rested his upper jaw upon the ridge and moved his lower jaw, with his spatulate incisors, up and down, as he gnawed from end to end, never slipping his firm upper jaw grip; then turning the bone over and doing the same upon the other side. Although known from the Forest Bed and Pleistocene cave and river deposits, and although it lingered on in the north of Scotland till about nine hundred years ago, it is now restricted to the far north of both hemispheres.

There were also probably other species of deer, about which more may be said on another occasion. Some of the bones which were placed to the credit of *C. elaphus* may really belong to another species, as they present even greater resemblance to the North American Wapiti.

Capreola Capra—Roedeer. This graceful animal, also a bequest from the Forest Bed, was here, as is indicated by some half dozen bones. It is also found in caves and drifts. It is one of the two fissure creatures that to-day shows a preference for the south, although it extends over the greater part of Europe.

Ovis?—Sheep or Goat. Bones pointing to either sheep or goat were also found, but as all this group of animals require working out afresh, the less said about the species present perhaps the better.

Sus scrofa—Pig. One upper molar of medium size, an incisor of very large size, and several fragments of limb bones, point to the presence of the tusky porker. Like the last-named, the genus represented upon the planet in and since Pleistocene times, require working out.

Mustela robusta—Giant Polecat. A number of bones and teeth of a giant polecat were also found by me, and subsequently a larger part of a skull and lower jaw were obtained by one of my old students, Miss Bevington, and subsequently given to Jermyn Street Museum by another of my old students, Col. Underwood. Messrs. Kennard and Corner also obtained several more limb bones. My esteemed colleague has given a description of these in the papers enumerated in the bibliography, pages 145-150.

Mustela vulgaris, var. *Minuta*—Pigmy Weasel. At the other end of the pole comes a new variety or species of weasel, of which several jaws and a number of limb bones were found. I have been to great trouble to find if this is extinct, as so many country workmen speak of a "kine" or small weasel. I paid a high price for every small weasel I could get brought to me for years, but in every case they turned out to be the young of the ordinary *vulgaris*. I have, therefore, no doubt that this species or variety is quite extinct.

Mustela vulgaris—The Common Weasel was also here at this time. I believe my friends, Messrs. Kennard and Corner, were even more fortunate than myself in regard to this species.

Mustela putorius—Polecat. As in the case of the weasel so with the polecats, bones of both species were found, and here again Messrs. Kennard and Corner appear to have been more fortunate than myself in securing skulls.

Meles taxus—Badger. A fair number of bones of this creature were

found, both young and mature, and a cub jaw. My friends, Messrs. Kennard and Corner, also secured a skull of this species. The species made its appearance in Pleistocene drifts and cave deposits, and now ranges over Europe up to high northern latitudes.

Lutra vulgaris—Otter. A fairly large number of bones of this or a closely allied species were found. It is true they are all young, but as the species comes up from the Forest Bed, and even possibly from the Norwich Crag, we are probably correct in our identification.

Ursus arctos—Brown Bear. Not much that can be set down to this creature occurs, but there is a fifth metacarpal that agrees so closely with a corresponding bone in *U. arctos* that there can be little doubt of the determination. Its specific name is enough to indicate the high polar regions to which it ascends in both hemispheres. It is not known from older deposits.

Hyæna crocuta—Spotted Hyæna. The terrible nocturnal prowler, the spotted hyæna, also found feasting fare among the foregoing, not stopping at the ponderous rhinoceros, as before noted. It is also known from the Forest Bed and river and cave deposits. It is the other, or, perhaps, only, fissure animal that shows a greater love for the south.

Felis cattus—Cat. Bones, teeth, and vertebræ of cat were found, and although one could not be sure as to the species, the positions in which these various bones were found in the fissure at various times during twelve years working would point to them being of Pleistocene age.

Canis vulpes—Common Fox. Bones of this creature existed in great numbers, beautiful skulls and jaws, larger limb bones, and the smaller ones of the toes, with here and there some curious osteological abnormalities. The fox claims a very ancient pedigree, coming up from the Red Crag through the Forest Bed, river and cave deposits, and to-day is found as far north as vegetation exists to support his prey.

Canis lagopus—Arctic Fox. The more beautiful woolly-footed arctic fox was also here in plentiful numbers. I believe only a vertebra had been found belonging to this species before in this country, and that in a cave; but here we had most perfect skulls, jaws, and every other bone. Its name denotes its arctic character.

Canis lupus—Wolf. Both in the quarry under consideration and in the fissures lower down the valley, bones of this species occurred, in one case a fairly complete skeleton. It is also an aristocrat coming from the Red Crag, through the Forest Bed and river and cave deposits, and to-day ascends high northern latitudes.

REMARKS.

As we reflect upon the arctic habitat of this whole assemblage of animals, we have brought before us climatic conditions of the severest character, such as we may imagine existed here in Glacial times. In the early days of geology, with the object of bolstering up certain prejudices and the making of the Thames Valley of post-glacial age, it was asserted that a

magic line was drawn somewhere along the Thames which stopped the Chalky Boulder Clay at Finchley and the Essex heights! Subsequent sections, however, revealed the deposit extending far down into the Thames Valley, while the Admiralty section showed that the Thames had been excavated to near its present level before the arctic *Betula nana* had passed away. Section after section in Essex revealed the Chalky Boulder Clay lower and lower into the valley, down to the lowest terrace; while railway excavation at Westcombe Park, south of the Thames, showed a section of it with the northern eratics, basalts and other northern rocks, Jurassic fossils—*gryphaea incurva* and *dilatata*, and *belemnites in situ*. Nor do they stop here. All over the plateau these *gryphae* and other northern fossils, and volcanic and metamorphic rocks, can still be found to the very edge of the chalk escarpment. While at places throughout the Wealden district magnificent festoonings and deposits characteristic of glacial action are to be seen, not, of course, forgetting the deposit at Brighton with its eratics from N.W. Europe.

I know of no finer terminal moraine in this country than that on the slopes of Oldbury, which for so long furnished road metal for London streets; and the Holmesdale Valley is an absolute duplication of the glacial valleys of Alaska to-day, closely strewn with its huge boulders weighing tons each, which no inland power but ice could move. All over the Greensand counterscarp are most remarkable deposits exactly similar to those of glacial regions, and unlike everything else; solid chert rocks, fractured by thermal fissure to a depth of twenty feet, which want of space unfortunately precludes us describing. But a detailed study of these leads us to picture a huge glacier on the counterscarp, then stretching away into the Wealden area, melting and carrying away its debris into the "Mid-way" Valley, peeling off the limestone by the yielding of the Weald Clay, and thus originating the face of the greensand escarpment. We see this action heading the "consequent" proto-Shode, which then formed a southern extension of the Darenth. We see also the yielding of the Gault Clay on the north, and the initiation of the Holmesdale Valley, and the formation of a glacial lake, and the giving way of the Counterscarp in which the Weald Clay was forced out from below, and with the 500ft. downthrow the drainage became entirely altered and the direction of the stream reversed. An outflow of the old glacial lake piercing the limestone gave rise to the subsequent gorge. While further to the east, from the higher grounds, ran streams, cutting the valleys to which we have previously referred.

It was during the cutting of these valleys that the Boro' Green stream got access into the fissures of the limestones, and there deposited its burdens. At first the tendency was to choke up their mouths, so that the bedding pointed inwards, but ultimately the furthest recesses of the chambers were reached and filled, until the flood-waters could reach no higher. Then commenced the action of the meteoric waters from above; in many places it destroyed all the easily attackable lime of the bones, but in others its work was too quick, and under the conditions under which such action takes place, the lime became re-deposited, and so sealed up the

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sacred archives into which the quarrying operations long subsequently broke. Several times during the working of the quarry the fissure-material formed the limiting-wall of the working, and it revealed a never-to-be-forgotten picture of the infilling of these fissures from the side.

Subsequent denudation broke into one of the most important fissures, and, finding an empty space, filled it with a hill-wash, entirely dissimilar in every way from the fissure material, and sealed it down again; but as we to-day bury our Edward VII coins under our foundation stones to proclaim to the world in the future the date of the sealing, so nature took the current molluscs of the day, *succinea oblonga* and *jamina muscorum*, and buried them in her sealing, to show to future generations that the Ightham fissures were filled up before the close of Pleistocene times.

SYNOPSIS OF THE MOLLUSCA OF THE IGTHAM FISSURES.

SPECIES FOUND IN THE IGTHAM FISSURES.	EXTINCT.	FOUND IN OLD RIVER DEPOSITS.	FOUND IN RIVER DRIFTS.	FOUND IN CAVES.	NEW TO BRITAIN.	MORE RECENT.	PLISTOCENE.	REMARKS.
<i>Limax maximus</i>	Linn.	o	x	x	x	x		Since found in Thames Valley. And at Barnwell.
<i>Agricolina agrestis</i>	Linn.	o	x	x	x	x		Since in old material from Happaway Cave. = Formerly <i>glaber</i> (in part?).
<i>Vitrea crystallina</i>	Müll.	o	x	x	x	x		
" <i>aliliaria</i>	Müll.	o	x	x	x	x		
" <i>rogerae</i>	B.B.W.	o	x	x	x	x		
" <i>nitidula</i>	Drap.	o	x	x	x	x		
" <i>radiatula</i>	Ald.	o	x	x	x	x		
" <i>cellaria</i>	Müll.	o	x	x	x	x		
" <i>fulva</i>	Drap.	o	x	x	x	x		
<i>Pyramisidula rotundata</i>	Müll.	o	x	x	x	x		
<i>Helicella itala</i>	Mont.	o	x	x	x	x		
" <i>cotoperata</i>	Linn.	o	x	x	x	x		
<i>Hypnomia hispida</i>	Drap.	o	x	x	x	x		
" <i>sericea</i>	R.N., F.B., O	x	x	x	x	x		
" <i>umbrosa</i>	Partsch.	x	x	x	x	x		
<i>Vallonia puchellata</i>	Müll.	x	x	x	x	x		
<i>Heleciona laevigata</i>	Linn.	x	x	x	x	x		
" <i>arbutorum</i>	"	x	x	x	x	x		
<i>Helix nemoralis</i>	Müll.	x	x	x	x	x		
" <i>hortensis</i>	Müll.	x	x	x	x	x		
<i>Zemania nuscornum</i>	Linn.	R.N., F.B.	x	x	x	x		
<i>Vertigo nitidissima</i>	Hart.	o	x	x	x	x		
<i>Classilla bidentata</i>	Strom.	x	x	x	x	x		
" <i>lamellata</i>	Mont.	x	x	x	x	x		
<i>Cochlicopa lubrica</i>	Müll.	x	x	x	x	x		
<i>Cæstilioides acicula</i>	Drap.	N.W., F.B.	x	x	x	x		
<i>Succinea oblonga</i>	Müll.	F.B., O	x	x	x	x		
<i>Carychium minimum</i>	"	x	x	x	x	x		
<i>Pomatiopsis elegans</i>			x	x	x	x		
<i>Unio</i> sp.			x	x	x	x		
TOTALS	30	1	8	28	11	1	1	

R. = Red Crag. N. = Norwich Crag.

W. = Weybourne Crag. F.B. = Cromer Forest Bed.

And (by the kindness of A. S. Kennard, F.G.S.)

I am also able to add O = Irish Caves.

SYNOPSIS OF THE VERTEBRATA OF THE IGHTHAM FISSURES.

Norwegian Lemming.		Arctic Lemming.			
<i>Lemmus (= Myodes) lemmus</i>	Linn.	x	x	x	x
" <i>torquatus</i>	Desn.	x	x	x	x
<i>Dicrostonyx</i> " "	Schreib.	x	x	x	x
<i>Ereotomys</i> (= <i>Microtus</i>) <i>glareolus</i>	Linn.	x	x	x	x
<i>Microtus amphibius</i>	Pallas	x	x	x	x
" <i>avarius</i>	Linn.	x	x	x	x
" <i>agrestis</i>	R. & B.	x	x	x	x
" <i>ratticus</i>	Pallas	x	x	x	x
" <i>eremicus</i>	Martins	x	x	x	x
" <i>nitidus</i>	Blum.	x	x	x	x
<i>Erethias primigenius</i>	Linn.	x	x	x	x
<i>Erethias caballus</i>	Blum.	x	x	x	x
<i>Rhinoceros antiquitatis</i>	Linn.	x	x	x	x
<i>Cervus Elaphus</i>	Linn.	x	x	x	x
" <i>St.</i>	F.B.	x	x	x	x
<i>Rangifer</i> (= <i>Cervus</i>) <i>tarananus</i>	Linn.	x	x	x	x
<i>Capreola Caprea</i>	Gray	x	x	x	x
<i>Ovis</i> sp (?)	?	x	x	x	x
<i>Sus scrofa</i>	Linn.	x	x	x	x
<i>Mastella robusta</i> Nov. sp.	Newt.	x	x	x	x
" <i>vulgaris</i>	Briss.	x	x	x	x
" <i>fuscus</i> new var. <i>minuta</i>	Newt.	x	x	x	x
<i>Melusina</i> <i>taenias</i>	Bodd.	x	x	x	x
" <i>leptorhynchus</i>	Linn.	x	x	x	x
<i>Lutra lutra</i>	Erxl.	x	x	x	x
<i>Ursus arctos</i>	Linn.	x	x	x	x
<i>Hyaena crocuta</i>	"	x	x	x	x
<i>Felis catus</i>	"	x	x	x	x
<i>Cionis tanais</i>	"	x	x	x	x
" <i>lagopus</i>	"	x	x	x	x
" <i>lupus</i>	"	x	x	x	x
Totals	84	20	27	34	37
					3
					21

C.C. = Coralline Crag. R. = Red Crag. N. = Norwich Crag. W. = Weybourne Crag. F.B. = Cromer Forest Bed.



A NOTE ON THE CHALK IN THE VICINITY OF IGHTHAM.

By H. J. OSBORNE WHITE, F.G.S.

IN view of the marked revival of interest in the Chalk, which has followed upon the publication of Dr. A. W. Rowe's attractive studies* of the natural and other sections on the South and East coasts of England, Mr. Bennett has considered it desirable that the general account of this formation given in the second chapter of the present work should be supplemented by notes of more particular and local character, and has requested the writer to embody in a short appendix the few facts so far to hand.

The information with respect to the Chalk of the Ightham district hitherto published is of a fragmentary and most exiguous kind, and the following rough sketch is drawn almost entirely from material recently collected by Mr. Bennett himself. It will be well to state that the present writer, though tolerably familiar with the interesting physiographical phenomena of the neighbourhood, has only a slight personal acquaintance with its rocks. With one exception, his brief visits were paid in the "Pre-Rowean" days, when, by reason of the prevailing uncertainty as to their limits, the life-zones of the "White Chalk" had not the value they now possess as aids in the study of the classic problems of Wealden "elevation" and "denudation," which at that time most attracted his attention.

As Mr. Bennett has already indicated the positions of the three major divisions of the Chalk in the fine escarpment that overlooks the village of Ightham from the north, the local stratigraphical details of the formation are offered without further preface.

The Lower Chalk of West Kent seems to have a thickness of rather less than 200 feet, and to be divided fairly evenly between the two zones of *Schloenbachia [Ammonites] varians* and *Holaster subglobosus*. No definite information on these points, however, is yet forthcoming, nor has Mr.

* "The Zones of the White Chalk of the English Coast," *Proc. Geol. Assoc.*, vols. xvi (6), 1900; xvii (1), 1901; xviii (1), 1903; xviii (4), 1904.

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Bennett observed any clear exposure of chalk referable to the first-named zone in the neighbourhood of Ightham.

The glauconitic sandy marl (Chloritic Marl), usually present at the base of the Chalk, has been seen "in the right bank of the watercourse issuing from a spring at Coney Hall Farmstead, half a mile south of Birling House,"* and the grey-buff argillaceous beds of the overlying Chalk Marl occasionally show in the sides of the lanes, and about the spring-heads, on the lower slopes of the escarpment to the west and north-east of Wrotham.

A good section of the grey, or greenish-grey, laminated Belemnite Marl marking the top of the *Holaster subglobosus*-zone, just capped by hard nodular beds (Melbourn Rock) of the Middle Chalk, is given in the pit on the north side of the Pilgrims' Road, at a point about one sixth of a mile north-west of Kemsing Church. Mr. Bennett found no fossils in the Marl, but it is not unlikely that the well-preserved guard of *Actinocamax plenus* (with some of its marly matrix still adhering), which he purchased from the occupant of a cottage at the quarry by the Gravesend road at Wrotham, was obtained there.

The Middle Chalk appears to be about 230 feet thick in this district. The zones of *Rhynchonella Cuvieri* and *Terebratulina*, into which it is divided, are both well exposed on the escarpment between Wrotham and Birling. Throughout the greater part of the English chalk-country, the lower limit of the Middle Chalk is clearly marked in sections by the contact of the yellowish, hard, nodular Melbourn Rock, at the base of the *R. Cuvieri*-zone, with the grey Belemnite Marl below; but the upper limit, in Kent at least, can be determined only by a careful collection of the fossils in a group of 'passage-beds,' several feet thick. There are good reasons for thinking that these passage-beds are displayed in the Gravesend road quarry, just mentioned, but the writer has seen no description of their features at that spot.

In a pit about a quarter of a mile north of Birling House, and rather below the 300-foot contour, Mr. Bennett saw hard nodular chalk (probably Melbourn Rock) passing up into thin-bedded white chalk containing many remains of thin-shelled *Inoceramus* (mostly *I. mytiloides*). The only other fossil he got is part of a *Rhynchonella* (not *R. Cuvieri*).

Near the middle of a pit, in rather lumpy white chalk, at the cross roads a little more than a quarter of a mile east-north-east of Bunker's Farm (Birling parish), and just upon the 300-foot line, there is a thin, rusty, conglomeratic band which consists of lumps of firm and hard chalk, containing hollow moulds of sponge-spicules, in a coarse gritty matrix rich in Asteroid-ossicles (mostly unornamented: a few punctate). Samples of the rusty band sent for examination yielded also:—

Scalpellum cf. simplex, Darwin

Ostrea sp. (fragments, with external undulate striation)

* A. J. Jukes-Browne, "Cretaceous Rocks of Britain," (*Mem. Geol. Survey*), vol. ii (1903).
p. 46.

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Rhynchonella Cuvieri ?, d'Orb. (small pieces)

Serpula plana, S. Woodw.

Conulus ? (chips)

Cyphosoma sp.,

while from the white chalk close above this conglomeratic layer Mr. Bennett extracted:—

Ostrea sp. (same as that noted above)

Spondylus latus, Sow.

Cidaris sp.

Conulus subrotundus, Mant.

The zone of *Rhyn. Cuvieri* is indicated.

Hard nodular chalk is to be seen in the banks of the lane south of Pilgrim House, and there are some small exposures of firm white chalk, like that of the *R. Cuvieri*-zone, along the Pilgrims' Road, to the south-west of that place.

The quarry which forms the conspicuous white scar on the south-western face of the promontory of the downs above Wrotham, is opened in the upper half of the Middle Chalk, and must expose nearly 100 feet of the *Terebratulina*-zone. The beds are, as a whole, massive and white, but contain thin bands of light-grey marly chalk, disposed at irregular intervals. In the upper part of the section, scattered small globular and "horned" flints, with grey rinds, are fairly common. The following fossils were collected here:—

Inoceramus Cuvieri, Sow.

" spp.

Ostrea sp.

Rhynchonella Cuvieri, d'Orb. (one, small)

Terebratula semiglobosa, Sow.

Terebratulina gracilis var. *lata*, Eth.

Asteroid-ossicle.

Bourgueticrinus.

Pharetraspiongia Strahani, Sollas

Haplophragmium sp.

Terebratulina gracilis var. *lata* occurs, sparingly, near the top and the bottom of the exposure. Flinty chalk, resembling that at the top of this quarry, but so far yielding little but chips of *Ostrea* and *Inoceramus* shell, is seen in the lowest part of the Gravesend road pit, three furlongs north-east of Wrotham Church, and at the top of another large but degraded excavation (600 feet o.d.) about one-third of a mile north-west of Kemsing Church. At the latter spot Mr. Bennett obtained:—

Inoceramus Cuvieri, Sow.

Ostrea vesicularis, Lam.

Spondylus spinosus, Sow.

Rhynchonella plicatilis, Sow.

Micraster cor-bovis ? Forbes (a small piece).

The flints here have thick rinds, in some cases stained red by iron oxide.

A greyish chalk, formerly worked in a large pit near the 400-foot contour

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north-east of Bunker's Farm, also may be in the *Terebratulina*-zone. *Rhynchonella plicatilis*, *Terebratula semiglobosa*, and a *Haplophragmium* were the only noteworthy fossils found there. The pit is a little to the north-west of, and about 100 feet higher than, that showing the conglomeratic bed described above.

The Upper Chalk, as Mr. Bennett has stated, is comparatively thin (60 to 100 feet) at the escarpment of the North Downs near Ightham; only the lower beds—comprising the zones of *Holaster planus* and *Micraster cor-testudinarium*, with, perhaps, a little of the *Micraster cor-anguinum*-zone—being there represented. Thanks to the richer fauna of these beds, however, the information concerning them at the writer's disposal is a trifle fuller and more definite than that relating to the older Chalks.

The highest beds exposed in the Gravesend road quarry at Wrotham clearly belong to the lowest, or *Holaster planus*, zone of the Upper Chalk. They are partly soft, partly hard and lumpy, and contain brown phosphatic concretions, and numerous small, thick-rinded flint-nodules, whose surfaces, in many cases, are studded with bits of *Inoceramus*-shell, Asteroid-ossicles, and other organic débris. From beds estimated to be about 10 to 12 feet below the highest chalk visible in the excavation Mr. Bennett collected:—

Inoceramus Brongniarti ?, Sow.

„ *Cuvieri*, Sow.

„ *spp.*

Spondylus spinosus, Sow.

Kingena lima, Defr.

Rhynchonella plicatilis, Sow.
„ *reedensis*, Eth.

Terebratula carneae, Sow.

„ *semiglobosa*, Sow.

Terebratulina striata, Wahl.

Membranipora sp.

Asteroid-ossicles [*? Metopaster Parkinsoni*, Sladen]

Bourgueticrinus.

Cidaris serrifera, Forbes

Cyphosoma sp.

Echinocorys scutatus, Leske

Holaster planus, Mant.

Micraster Leskei, Desm.

Plinthosella squamosa, Zitt.

From the circumstance that the three examples of *Micraster* found by Mr. Bennett are all referable to *M. Leskei*, it is to be inferred that these beds are in the lower part of the zone of *Holaster planus*; for at higher horizons in this zone the dominant Micrasters are those of the *præcursor*-group of Dr. A. W. Rowe.* The nodular beds by which the Chalk Rock is represented in Kent not improbably come on just above the beds par-

* "An Analysis of the Genus *Micraster*, etc.," *Q. J. G. S.*, vol. lv (1899), p. 530.

ticularly examined by Mr. Bennett, and in a part of the quarry-face which at present is inaccessible. Making some allowance for a probable northward dip, there seems to be room for about 70 or 80 feet of newer beds between the top of this quarry (700 feet o.d.) and the crest of the escarpment at Wrotham Hill (761 feet o.d.).

The middle and upper beds of the *H. planus*-zone, and the lower part of the succeeding *Micraster cor-testudinarium*-zone, are well shown in the cutting of the lane which runs obliquely down the Chalk escarpment, from Holly Hill to the Pilgrims' Road east of Bunker's Farm. Between the 500-foot contour and the turning to Punish Farm (from 70 to 80 feet higher), Mr. Bennett observed a hard, nodular, cream-coloured chalk, consisting of yellowish, semi-crystalline lumps in a soft greyish-white matrix; overlain by friable white chalk with harder lumps, and containing numerous small, brown, perforated concretions, and scattered flints. The fossils collected by him include:—

Inoceramus spp.

Spondylus spinosus, Sow.

Terebratula carnea, Sow.

Serpula granulata, Sow.

“ *ilium*, Sow.

“ *macropus*, Sow.

“ *plana*, S. Woodw.

“ *plexus*, Sow.

Bourgueticrinus.

Holaster planus, Mant.

Micraster cor-bovis ?, Forbes (small pieces)

“ *cor-testudinarium*, Goldf.

“ *Leskei-præcursor*, Rowe

“ *præcursor*, Rowe

Porosphaera globularis, Phill.

The Micrasters of the *M. præcursor*-group (including *M. cor-testudinarium*) in the collection range from the “sutured” and “moderately-inflated” forms characteristic of the *Hol. planus*-zone, to the “sub-divided” and “strongly-inflated” types of the zone above, and they are sufficiently numerous to warrant the belief that the determination of the common zonal limit in this section would present little difficulty to anyone familiar with the horizontal features of these echnoids.

Mr. Bennett found part of the same group of beds exposed in the Fair-seat road at Stanstead (or Stansted), about two miles north of Wrotham. At or near the spot where the road crosses the 500-foot level, there is a long but rather overgrown face, about 15 feet high, showing the cream-coloured nodular bed, “weathering out in hard lumps,” and the overlying thin-bedded flinty chalk with brown concretions. Most of the fossils named below were found in the higher beds. The only noteworthy specimen from the lower is a mould of *Solariella gemmata* [= *Turbo gemmatus*, Sow.] — a gasteropod, suggestive, though not diagnostic, of the horizon at which the Chalk Rock is developed.

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- Solariella gemmata*, Sow.
Dimyodon Nilssonii, Hag. [= *Plicatula sigillina*, S. P. Woodw.]
Inoceramus Cuvieri, Sow.
 " *spp.*
Lima Hoperi, Sow.
Ostrea vesicularis, Lam.
Spondylus spinosus, Sow.
Rhynchonella plicatilis, Sow.
 " *reedensis?*, Eth.
Terebratula carneae, Sow.
 " *semiglobosa*, Sow.
Berenicea papillosa, Reuss
 " *papyracea*, d'Orb.
Eschara Danae, d'Orb.
Serpula sp.
Cidaris hirudo, Sorig.
Holaster sp.
Micraster cor-testudinarium, Goldf.
 " *præcursor*, Rowe
Pharetraspomgia Strahani, Sollas
Porosphaera pileolus, Lam.
Ventriculites radiatus, Mant.

[The writer is indebted to Mr. Llewellyn Treacher, F.G.S., for the determination of the Bryozoa in this and succeeding lists.]

The few Micrasters obtained here are of the types occurring in beds at, and rather below, the junction of the *Holaster planus* and *Micraster cor-testudinarium* zones.

Farther up the road, at an altitude which he estimates to be about 550 to 560 feet o.d., Mr. Bennett found a rubbly exposure of coarse white chalk, with some slightly iron-stained lumps of a harder nature, and a few flints. At one spot a layer, or lenticle, of gritty chalk, with many *Terebratulae*, Bryozoa, *Serpula ilium*, Crinoid-ossicles, and chips of *Micraster*, was noticed. The fossils obtained are:—

- Inoceramus Cuvieri*, Sow.
Ostrea sp.
Spondylus spinosus, Sow.
Rhynchonella plicatilis, Sow.
 " *reedensis*, Eth.
Terebratula carneae, Sow.
 " *semiglobosa*, Sow.
Berenicea gracilis, Edwards
Clausia Franciana, d'Orb.
Melicertites Lonsdalei, Greg.
Nodelea durobrivensis, Greg.
Truncatula sp.
Serpula ilium, Sow.
Terebella lewisiensis, Davies

Bourgueticrinus.

Micraster sp.

Porosphaera patelliformis, Hinde
sp.

" *Coscinopora quincuncialis* ?, T. Smith.

Though proof of the age of this chalk is wanting, the writer is much disposed to refer it to the zone of *Micraster cor-testudinarium*. The abundance of Bryozoa and of undersized examples of *Serpula ilium* are, at least, suggestive of this horizon. But if the *M. cor-testudinarium*-zone has the same thickness near Stanstead as at the South Foreland, near Dover, viz. 56 feet,* its upper limit must be close at hand, for, as already stated, its junction with the *H. planus*-chalk is seen in the lower section on this road.

A quarter of a mile south of Boughurst Street, near Harvel, and a little above the 500-foot contour, there is a pit showing 10 feet of firm white chalk, rather hard and lumpy in places, and containing a few flints and a well-defined band of *Inoceramus Cuvieri*. The other fossils recognised are :—

Ostrea sp.

Spondylus spinosus, Sow.

Serpula ilium, Sow.

Cyphosoma spatuliferum, Forbes.

This chalk, also, probably is in the *M. cor-testudinarium*-zone.

From a pit in white chalk with irregular layers of nodular, more or less spongeous, flints, situated on the 500-foot line about a quarter of a mile east of Harvel, Mr. Bennett got :—

Inoceramus Cuvieri, Sow.

Ostrea vesicularis, Lam.

Biflustra variabilis ?, d'Orb.

Vincularia labiatula, d'Orb.

Asteroid-ossicles.

Bourgueticrinus.

Cyphosoma sp.

Holaster sp.

Coscinopora sp.

The age of the beds here is doubtful, though the position of the pit, the characters of the chalk and flints, and the presence of *Holaster* (remnant of a large test, like that of *H. placenta*) favour a reference to the zone of *M. cor-testudinarium* (upper part).

The Harvel pits just noticed are on the slopes of combes, and some distance below the general level of the plateau-surface to the east and west. Between the beds in which they are opened and the base of the Eocene outlier of Punish Farm, about one mile east of Harvel, there seems to be room for nearly 100 feet of newer chalk, but to judge from the character of the samples collected from small exposures above and below the 600-foot level within a quarter of a mile south-west, and north-east, of the sandy

* Rowe, *Proc. Geol. Assoc.*, vol. xvi (1900), p. 308.

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outlier mentioned, it would not be safe to assign much more than 70 feet of this chalk to the zone of *Micraster cor-anguinum*.

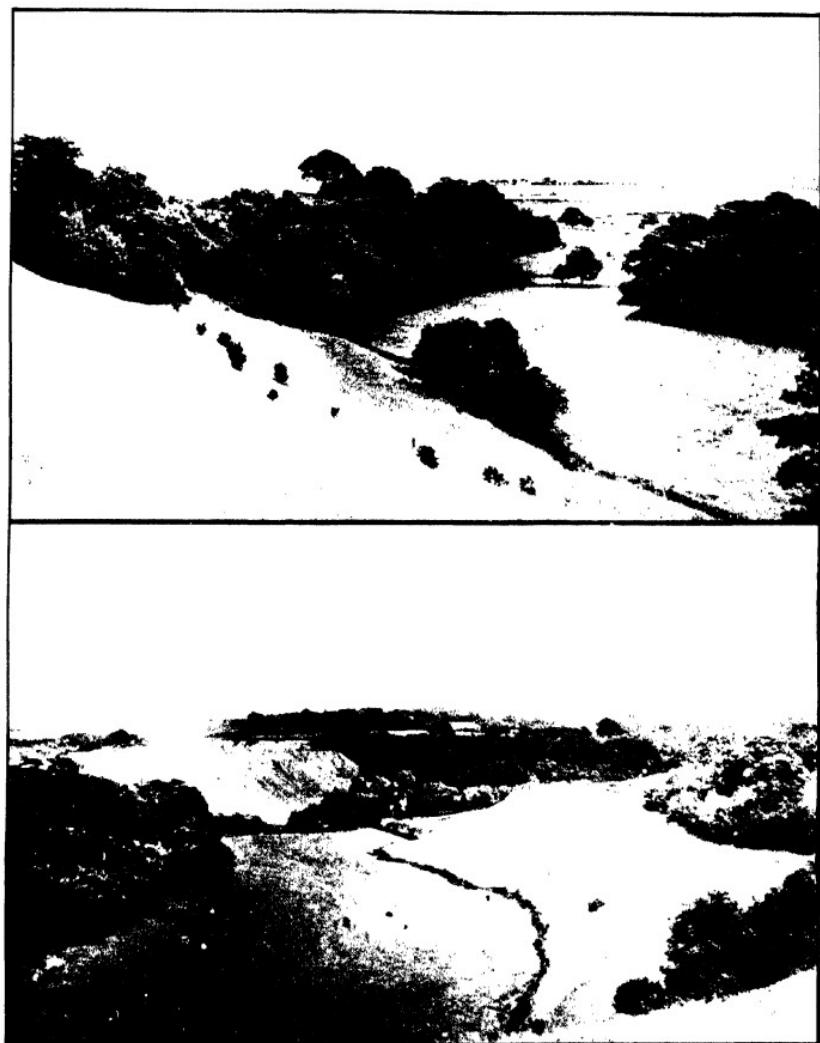
Mr. Bennett has not discovered any excavations certainly in the *M. cor-anguinum*-zone, but the flinty chalk of which it is known to consist must generally underlie the drifts with Eolithic implements on the more even portions of the North Downs between the Darent and Medway Valleys. Though very thin, or wanting, at the crest of the upland, it gradually thickens northward, presumably by reason of the oncoming of the "high-zonal" beds which form the quarried bluffs on the right bank of the Thames at Greenhithe, Northfleet, and Cliffe.

In conclusion, it may be remarked that, if the thinness of the Upper Chalk in the higher parts of the Downs near Ightham is the result of erosion—as almost certainly is the case,—then the presence of Lower Eocene outliers near the edge of the Chalk escarpment, at Punish and Knockmill,* shows that this erosion occurred, in a large measure, before the Lower Eocene strata were laid down. The oblique character of this early reduction, or planation, of the Chalk in West Kent† suggests that the Cretaceous rocks of that area had already been slightly tilted by differential movements, whose local effects were similar in kind (but not in degree) to those of the later disturbances responsible for the northward inclination of the Eocene Beds in the same area; but until more is known concerning the topographic limits of the higher zones of the Chalk in the south-east of England, it will not be possible to say, whether the inferred early Eocene, or pre-Eocene, movements marked the initiation of the Wealden dome, or were connected with some other crust-warp, whose position happened partly to coincide with that of the periclinal fold just mentioned.

A further bevelling of the Chalk near the southern edge of the "Kentish Plateau" seems to have taken place in Mio-Pliocene times. The signs of this relatively-recent, and probably imperfect, planation are, however, much less distinct there than in the corresponding portion of the North Downs in East Kent; where Eocene outliers are absent, and the remnants of a peneplain of erosion—cut, in places, in the Middle Chalk, and bearing numerous patches of Older Pliocene iron-sand—are traceable for some distance down the gentle slope north-east of the crest-line.

* The Knockmill outlier, N.W. of Wrotham, is much disturbed, and its beds may be some way below their original position.

† Noticeable also in East Surrey. See G. W. Young, *Proc. Geol. Assoc.*, vol. xix (1905), p. 190.



Photographs

THE GORGE OF THE RIVER SHODE,

(1) THE COMMENCEMENT OF THE GORGE. (2) THE GORGE A LITTLE FURTHER DOWN.

"Mr. E. W. Farnes



III.

A THEORY OF THE FORMATION OF THE GORGE OF THE SHODE AND OF SIMILAR ADJACENT GORGES.

THE cause of the formation at the Shode Gorge has given rise to more than one attempt at explanation,* and the one now offered differs from the others in that it introduces a suggested new factor in valley formation.

It having occurred to the writer that subaerial denudation alone, in this and in other like cases, could not have formed this gorge and the similar adjacent ones, he sought to find a contributory factor not hitherto recognised.

When looking at the present course of the Shode, which is apparently the sole cause of the gorge, it seemed to the writer, on reflection, to be too short and the gradient not steep enough to have done so much work in so short a distance, *i.e.* to cut out a chasm 120 feet in depth in a course of two miles.

A little further reflection made it clear that when both the Chalk Escarpment and that of the Lower Greensand, including here the Hythe and Folkestone Beds, were nearer together, as they *must* have been in former times, that the course of the Shode may have been shorter still, and the gradient perhaps less.

If then these two escarpments were once nearer together in long past times, so would the softer Folkestone Beds, at some distant period before they had suffered so much by subsequent denudation, have extended further over the harder Hythe Beds than they now do. These Folkestone Beds now extend as far south of Ightham as Ivy Hatch, but do not now go farther east of that place but must once have done so.

Suppose they extended, as may well have been the case, as far south as Plaxtole and still further east of that place. Then we should have had the present site of the Shode valley, at least as far south as Plaxtole and some way farther east, covered by the Folkestone Beds, and under artesian conditions. For the water in the Hythe Beds, the principal water-bearing bed in the division of the Lower Greensand here, would be pent up between the Atherfield Clay below and the clayey Sandgate Beds above.

When the present Shode began to cut through the Folkestone and the Sandgate Beds, the hydrostatic pressure of the pent up water in the Hythe Beds would become released as lines of weakness in these beds, such as

* See Appendix, p. 117.

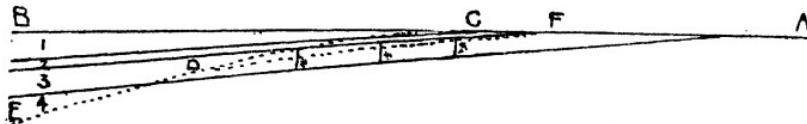
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joints, were reached; and up these lines of weakness we might expect the released water to rush with great force.

Now previous to this, these underground waters may have been forming an underground channel along the site of the present valley and thus determining the direction of it; so that with this contributory underground erosion and upward work of the released water, acting in concert with the downward erosion of the visible stream, the work of the cutting out of the valley would be very much facilitated and the time demanded for the work would not be nearly so long as if subaerial action only were here the prime factor of valley denudation. This upward action of the water at lines of weakness

DIAGRAM

Showing the suggested mode of formation of the Shode and other similar gorges by the action of the visible river cutting down and releasing the pent-up water in water-bearing bed where the area in question is under artesian conditions.



1—Folkestone Beds, Sand.

2—Sandgate Beds, clayey sand.

3 Hythe Beds, limestone (rag) and Hassock water-bearing bed.

4—Atherfield clay.

A, B—Original course of stream.

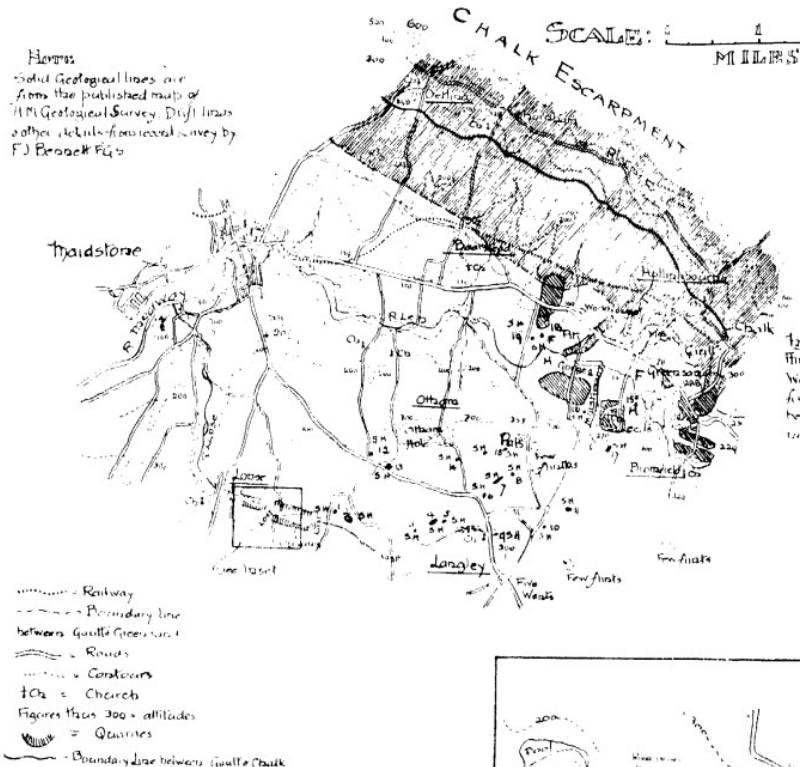
C, D, E and F, D, E—Subsequent courses of stream, when it had cut through or nearly through the Sandgate Beds towards lines of weakness in the Hythe Beds, such as fissures and joints, at * and released the pent-up water in the Hythe Beds along these. Where no impervious top stratum occurs a frozen soil-cap would so act.

might also be expected to cause subsidences, and afterwards swallow holes, of which there is a very remarkable one between The Warren and Crowhurst at 350 o.d. parallel with the present valley. This subsidence had long ago been noted by Mr. Harrison and had been independently mapped by the writer, and though Mr. Harrison is most cautious in giving any opinion as to the theory here set forth, yet he has admitted that it may account for that subsidence which appeared to him hitherto unaccountable.

Coming now to facts, we know that when wells are bored under artesian conditions and the water-bearing strata reached, the water does very often burst up with great force, and we are here supposing nature to be acting as man does and that the same results would follow when vertical lines of weakness are reached.

Now it is noteworthy that the Shode Gorge commences just at the junction of the Folkestone Beds with the Hythe Beds, and the steepest part of the gorge is between this junction and the powerful springs at and below Binstead, where the Atherfield Clay is reached. This part of the valley, and also the Bewley and similar adjacent valleys, may have been initiated

SKETCH MAP OF A REMARKABLE AREA A BATTLEGROUND OF STREAMS

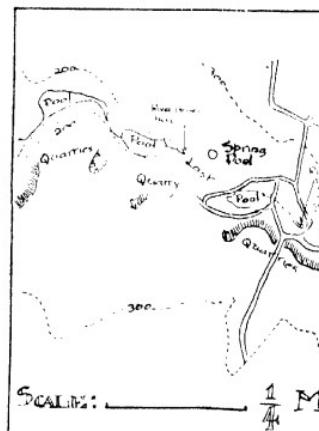


Chalky Scarps Drift as at Hollingbourne Site
in Cottling

= Quarries of Flinty Scarps Drift + Ochreous Plateau
 Gravel apparently cut into it by the Lenz, with
 rude Paleoliths only, found on the surface
 and in the two pits

F = Folkestone Beds H = Hythe Beds. The River
 flows over one mile. West of Brimfield is the
 boundary between these.

Pits = Paleoliths found S.H. = Swallow Holes



by a south to north drainage from off the vanished crest of the Weald, and that part of the valley south of Broadfield formed later by north to south drainage, where the Weald Clay comes on and the valley alters in character, widens out, and signs of terracing may be seen. Another important fact is that the Bewley valley, that dry one between The Warren and Bewley Farm, has its head at the swallow hole at Dale Cottage, Ivy Hatch, so that this valley, which also is parallel with the junction of the Hythe and Folkestone Beds, begins at a swallow hole which is at the junction of the Sandgate and Hythe Beds. In this swallow hole *the water rises up*, and the writer believes that all swallow holes, in their *first stages*, began *from below*, acting, indeed, as natural artesian wells, when the water was tapped by subaerial denudation cutting down to and releasing the water. There may also be an underground stream below the Bewley valley connecting with the Shode River: there is a never-failing pond half way down that must be fed by a spring.

The other gorges are along the course of the stream, rising at Wrotham Water, at the junction of the Gault with the Chalk, and running south to Ford Farm, and with another source three-quarters-of-a-mile due west of Ford Farm and running along the junction of the Gault and Folkestone Beds.

The first gorge is at St. Vincents, and this starts at, and for half-a-mile is coincident with, the junction of the Folkestone and Hythe Beds.

The second gorge is at the base of the fine river cliff at Ryarsh Ruffets, and the valley here is, for half-a-mile, a ravine cut through the Folkestone to the Hythe Beds. The third gorge is at Malling wood, just north of W. Malling, and here the gorge coincides with the junction of the Folkestone and Hythe Beds, and is three-quarters-of-a-mile long.

Another tributary to this stream is that rising at St. Leonard's Tower, W. Malling, this has apparently cut a deep gorge through the Folkestone outlier down to the Hythe Beds, in a very similar way to the Shode Gorge, only that is an anti-dip one and the St. Leonard's Gorge is a dip one. So here we have five gorges, three running along the strike, with two others, an anti-dip and a dip one.

It would thus appear that neither strike nor dip, *per se*, is the cause of these gorges.

We must, therefore, take the agreeing and not the discordant factor—which is that they all occur at the junction of the Folkestone and Hythe Beds, and here we have tried to show that the cause is the contributory one of the visible stream acting in concert with the invisible one, and cutting down and releasing the upward hydrostatic pressure and causing the subsidence-plus-erosion gorge.

The evidence for this in the St. Leonard's Gorge, as being on a small scale seems much clearer than that of the Shode Gorge, and it seems more difficult to see how the stream here alone, and at its fountain head, could have had the running power necessary to cut out, unaided, the deep gorge we see at St. Leonards. Indeed, the evidence for subsidence seems clear in this case, and when this is pointed out, as has been done by the writer to those

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whom he has conducted there, they seem ready to admit this evidence as more convincing than that in favour of erosion only.*

There are other points, but as we must be as brief as we can in a work of this nature, we cannot raise them in a statement of this new factor of upward hydrostatic pressure, and of underground erosion acting concurrently with subaerial denudation in valley formation in the cases here treated of.†

* The upward force of released hydrostatic pressure was most strikingly exhibited when sinking the hole for the sewage tank near the fountain-head at St. Leonards some ten years ago. The hole soon filled when the spring was reached, but this was pumped out and the tank fixed, but the water had risen so strongly during the night that next morning the tank was forced out of the hole, and it was only afterwards, by employing a steam pump and pumping for several days, that they lowered the water-level sufficiently to allow the tank being securely fixed.

† The evidence for these underground streams seems strong, as Mr. Harrison tells me that well sinkers have informed him that they have been met with when sinking wells in the Hythe Beds, and that they have proved the direction of the stream by dropping pieces of paper down the well. I have seen such a shallow open well in a garden north of Broomfield Church. See Map of Loose, etc., p. 134.

NOTE ON PROF. GOSSELET'S PAPER REFERRED TO AT PAGE 150.

At the last moment, I am able, through the kindness of Mr. Jukes-Browne, to refer to the above paper. Though not a convert to my views, Mr. Jukes-Browne has sent this paper to me remarking, "you will see that your idea of combined subterranean and surface erosion has occurred to Prof. Gosselet."

The description of these *creuses*, which it should be noted occur in a *chalk* area, though not as full as might be desired, agrees in some ways with the longitudinal form (the other is the crater-shaped) of the peculiar "swallow holes" (as I term them, not wishing to introduce a new name), which I have discovered in the Hythe Beds area and referred to in this book (See map). I am not surprised that they should hitherto have escaped notice, as they are in most cases quite concealed by thick copses, so much so, that on the Ordnance Map they appear only as *woods* and not as holes.

As, however, the Ordnance Maps of Kent are now being revised, and as I have called the attention of the Revising Officer to them, they will, in the new edition, be indicated as holes, and the local names will be inserted.

It is a matter of much satisfaction to me that Prof. Gosselet's *creuses* should occur in a chalk area, as I have long held that the dry-chalk valleys are largely due to subsidence from underground erosion, and have tried to get this opinion officially recognized, but without success.

In my *Guide to Newbury* of 1890, on pp. 102 and 103, in the section dealing with the "Bournes" in the chalk round that town, I refer to the "vast amount of excavation of the soil that must take place *underground* from both the *chemical* and *mechanical* action of water This underground excavation along these valleys must have helped much in their formation."

The solution of the problem afforded by these *creuses* has, as he states in his paper, occupied Prof. Gosselet during the ten years he has been making the geological map of Artois, and "after much hesitation" he has always come back to the idea that they are due to subsidence arising from combined surface and underground erosion, but more especially to the latter, which he considers to have been hitherto underrated.

This is the more to be wondered at, as the results of water analysis, the tufa deposits of our area alone, and the numerous caves in limestone areas, many of them extending a long way underground, like those in and near the Mote Park, Maidstone, speak loudly of the amount of solid material removed by underground water.

F. J. B.

IV.

THE LOOSE VALLEY.

ON MR. HARRISON'S ADVICE I HAVE VISITED THE LOOSE VALLEY, AS, FROM THE RECOLLECTION OF A VISIT PAID TO IT MANY YEARS AGO, HE THOUGHT IT WOULD SUPPORT MY VIEWS ON THE FORMATION OF THE SHODE VALLEY AND OTHER GORGES, WHICH IT SEEMS TO DO IN A VERY REMARKABLE MANNER, AND TO BE DUE, AS IN THE OTHER CASES, TO A COMBINATION OF CAUSES AND NOT TO SUBAERIAL EROSION ALONE, THOUGH THAT, AS IN THE OTHER CASES, HAS BEEN AN INITIAL ACTION.

THE SUGGESTED CAUSES ARE: (1) SWALLOW HOLES, IN THIS CASE, PERHAPS, BETTER TERMED BLOW HOLES, BROUGHT INTO PLAY BY THE RELEASE OF HYDROSTATIC PRESSURE BY THE VISIBLE STREAM CUTTING DOWN TO THE LINES OF WEAKNESS REPRESENTED BY THESE HOLES.

(2) SUBSIDENCES CONSEQUENT ON THE EROSION AND CHEMICAL ACTION OF THE UNDERGROUND WATER, THE ACTION OF THIS WATER WOULD, I CONSIDER, BE VERY MUCH INCREASED WHEN THE AIR PRESSURE, ON THE RELEASE OF THE HYDROSTATIC PRESSURE, WAS DIMINISHED, AS THE UNDERGROUND FLOW WOULD THUS BE MUCH ACCELERATED.

(3) THE EFFECT PRODUCED BY THE THICKNESS OF THE HASSOCK IN PROPORTION TO THAT OF THE RAG.

THE LOOSE TAKES ITS RISE A LITTLE TO THE EAST OF LANGLEY CHURCH, BUT OF LATE YEARS THE COURSE FOR A MILE, EXCEPT AFTER HEAVY RAINS, IS MOSTLY DRY. IT RUNS IN A WESTERLY DIRECTION TO LOOSE, THEN TURNS DUE NORTH, AND JUST BEFORE ITS JUNCTION WITH THE MEDWAY AT TOVIL, TURNS TO THE NORTH-WEST. IT HAS A COURSE OF ABOUT FIVE MILES, DURING WHICH IT DISAPPEARS OR IS LOST—AND THIS MAY ACCOUNT FOR ITS NAME—AT LEAST TWICE, ONCE FOR MORE THAN HALF-A-MILE AND THE SECOND TIME FOR MORE THAN A QUARTER-OF-A-MILE. BUT THE NOTABLE FACT IS THAT AT THE PLACES WHERE THE STREAM IS LOST THE VALLEY ALSO PRACTICALLY IS NON-EXISTENT, THIS SEEMS CLEARLY TO SHOW THAT HERE AT LEAST SUBAERIAL EROSION HAS HAD LITTLE EFFECT IN THE DIRECT FORMATION OF THE VALLEY.

(1) SWALLOW HOLES* WOULD SEEM TO HAVE PLAYED A VERY IMPORTANT PART IN THE FORMATION OF THE VALLEY, WHICH PROBABLY HAD ITS ORIGIN IN A SERIES OF THEM. ON THE MAP NINE ARE TO BE SEEN PARALLEL WITH THE LOOSE,† AND THE TWO, NOS.

* I AM AWARE THAT I AM USING THE TERM *swallow hole* OUT OF ITS USUAL MEANING, BUT FIND THAT I CANNOT WELL HELP DOING SO AS SOME OF THEM IN THE AREA NAMED STILL ACT AS SUCH, WHILE SOME HAVE CEASED TO DO SO. SWALLOW HOLES SEEM TO ME TO HAVE PASSED THROUGH A SERIES OF STAGES, BEING INITIATED BY AN UPWARD PRESSURE OF WATER, AND THAT WHERE THEY NOW ABSORB WATER THEY ARE IN A LATER STAGE.

† SEE MAP, p. 134.

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10 and 11, mark the former extension of the stream to the east. Further north nos. 6, 7, 18 are in the watershed, and still further north nos. 12, 13, 14, 15, and 16 are in the valley of the Len.* It will be observed that all these occur along definite lines, those of weakness or of joints. Many of these holes bear distinctive names, such as "Moll's Hole," "Bogie Wood Hole," etc. In every case these holes are occupied by thick wood, and so might easily escape detection, and apparently have hitherto done so. The present source of the Loose begins with a swallow hole which after heavy rain takes in all the water falling to it. Again on the north side of the valley on the highest part, and only just within it, are three well defined swallow holes close together, one of these called Langley Hole, quite hidden in a wood, is a very large one, with steep and almost vertical sides sixty feet deep at least and with a most irregular bottom full of deep holes; it is also called Jacob's Hole, and seems due to water action. Again, north of Offham, near Malling, are six similar holes all along one line, and the last two are often full of water.

(2) That the valley seems due to subsidence is shown by the steepness of its sides and the absence of any broad alluvial spread.

(3) The part played by the proportion which the Hassock bears to the Rag in the formation of this valley seems very marked.

It is clear that the softer the material in which a valley lies, the easier the work of denudation becomes and vice versa. Now the particular part where the stream is lost, and the valley also, is that part occupied by the quarries, and they must date very far back, perhaps to Roman times, as remains of that date are found there. The workings show that the Hassock is thin, and that the Rag preponderates, and in one part, no longer worked, there seems to be no Hassock at all, so that the inference would be that where the valley is most marked there the Hassock was thickest, and that the quarries and losses of the valley occur where the Hassock is thinnest.

There are many other matters of interest connected with the Loose, such as its diversion due south, just about where the first loss occurs, where it is said to go underground for a mile and to issue by the church, but enough has been said to show how it supports the view set forth on the formation of the Shode Valley.

The following reference to the Loose occurs on p. 112 in Topley's *Memoir of the Weald*, and he would refer the reappearance of the Loose after its loss at Boughton Quarries to *faulting*; he says, "Stiff brownish clay is seen beneath the Kentish Rag at Loose, and the Atherfield Clay may also be traced some way down the valley. To the east it is faulted against the Rag. This fault may be seen in the quarry face on the south of the valley, whilst on the north it appears to be indicated by a sharp bend in the hillside. The stream, which beneath Boughton Quarries flows underground, is brought to the surface by this fault."† The stream flows above ground from Langley to Boughton Quarries, along "here the clay is probably not far from the surface."

* See Map, p. 134.

† The italics are mine.

CAVES AND SWALLOW HOLES AT WILLINGTON STREET.

The author's attention having been recently called to some caves in the Hythe Beds at Willington Street, close to St. John's Church, Mote Park, he took the opportunity of visiting them, and hopes that the insertion of this brief note will lead to further investigation.

The caves in question are located in a deep ravine* running due north from the Bell Inn to its junction with the Len near the Mote Park. The ravine is very narrow until the caves are reached, midway, that is, between St. John's and Otham churches; it then widens out. The caves occur in the west face of the ravine east of St. John's Church, which shows here a face of about 25 feet. They are of varying size, the largest has an opening nearly 20 feet in height, and is very imposing.

On entering, the passage divides up considerably, the branches are much encumbered with blocks fallen from the roof, and the progress of the explorer is slow, much caution being needed.

There are present all the characteristics usually seen in limestone caves, and the height of the roof varies very much. The passages follow joints and fissures in the limestone, the Hassock is very thick, and the occurrence of the cave seems mainly due to the dissolution of this softer stratum.

It would seem that at one time the face of the ravine had here been quarried and cut back, and this operation may have removed any traces of early man's occupation; the use of such caves as a shelter would have been very likely. The author's opinion is that if the talus at the foot of the cave face were carefully trenched, traces of early man might be found, and it is hoped this may be done now that attention has been called to the matter.

It seems that these caves have been known for some time, and may have been described: similar caves may be seen in the old quarries in the Mote Park, Maidstone, close by. So far the writer has not met with any article thereon, but persons have lately told him that, when children, they explored them, taking candles to light them and a ball of string, one end of which was fastened to the entrance to guide them back. They stated that they penetrated for a long distance. Mr. Topley, in his *Memoir*, apparently alludes to these caves at p. 117, where he says, "Just west of Otham "Church are large old workings where the stone has been got by driving "levels into the rock; many of these caves thus formed are still open."

Here these "caves" seem referred to as "workings," but they appear to me to be natural and not artificial, and I gather from a letter from Mr. W. H. Bensted, to whom I wrote for information, that he went a long way into them some years ago, and that he considers them to be natural fissures that have been enlarged by quarrying.

That part of the ravine south of the caves to the Bell Inn contains many swallow holes, and the interesting point in connection with them is that

* See S.H. 12 on Map, p. 134.

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some in the upper part contain water and some are dry. North of the caves the ravine is dry, but just before the junction with the Len is a spring pool connected, perhaps, with the swallow holes in the upper part. This condition of affairs tends to confirm what we have suggested in the case of the Loose Valley, that these swallow holes are fed by water rising from below. That hole near the Bell Inn, at the head of the ravine, must be fed by a strong spring, as large quantities of water are pumped from it to wash the hops in the gardens round about.

F. J. BENNETT.

V.

[Extracted from the GEOLOGICAL MAGAZINE, Decade V, Vol. III,
No. 500, February, 1906.]

MACHINE-MADE IMPLEMENTS.

BY

F. J. BENNETT, F.G.S.

ATTENTION has lately been called by M. Marcellin Boule to the production in cement-mills in the Commune of Guerville, near Mantes, of all the more characteristic forms of Eoliths, and of these he has given photographic reproductions. The evidence for the necessarily artificial shaping of Eoliths had for many years been questioned by him, because he had found chipped flints of this character in the midst of Oligocene or Miocene beds in Auvergne and in the Velay; and it seemed imprudent to infer the existence of man in those early stages of the Tertiary period in the absence of osteological evidence.

In speaking here of machine-made implements I do so advisedly, because all stone implements were once referred to natural or supernatural causes; the obvious arrow-head, for instance, being termed an 'elf-bolt.'

M. Boule, however, seeks only to show that stones shaped like Eoliths may be produced by Nature, because he finds that they are produced by certain pseudo-natural, machine-made torrents, and so considers that Eoliths are due to such torrential action. Yet the Eolithic deposits known to the writer do not seem to indicate torrential action.

The first objection is that M. Boule compares known and unnatural agencies with natural ones, and the analogue of his machine-made torrent would be hard to find in Nature and would be most exceptional there, and yet to this he would refer all Eoliths.* The Mantes wash-mill apparently deals only with flints fresh from the chalk, while the flints from which the Kent plateau Eoliths were made were mostly tough and much weathered, and not as a rule such flints from which good chipping can be obtained;

**Nature*, Aug. 31, 1905, p. 438; Sept. 28, p. 538; and Oct. 26, p. 635; see also *L'Anthropologie*, vol. xvi, p. 257, in which the detailed observations of M. Boule are published.

and that may account a good deal for their rough execution, and for their non-acceptance by some observers.

Anyone who is a flint-knapper knows that the results obtained from the one kind of flint are very different from those obtained from the other, that the fracture varies with the flint, and that in some flints the human fracture is not distinguishable from the natural fracture.

The mill also rotates at a definite speed for a definite time, and so cannot compare with Nature. In order to get any results of value, the flints should be examined first, and samples taken out from time to time and compared, and yet the flints in question are only taken out after about 29 hours' interval.

There is another complication, which also seems to introduce a human element, if we may say so, in the case of the harrows with chain attachments, and these harrows in one of the mills visited by the writer were also weighted with old gear wheels, etc. So that, added to the impact of flint against flint, there is also a possible knapping action due to the teeth of the harrows and to the links of the chains, and these, in shape and possibly in effect, would compare with the pebbles used in knapping; the teeth, too, of the old gear wheels may also be chipping agents. Hence it becomes more difficult to say by which of these agencies, or by their combination, the fractures are produced. Thus any quasi-human results may be due to these quasi-human agencies introduced.

It is also possible, if the area contains worked flints, that these may be introduced. And in the cases we have investigated such flints do occur in the area. The analogy also with Nature would be closer if the harrows, etc., could be removed and the flints subjected to the torrential action of the water only.

In chalk wash-mills, as in the examples mentioned, much must depend on the proportion of the flints to the mass of the chalk and on their size, as the more numerous and the larger the flints, the more will they be affected, and *vice versa*. Thus the power of the mill, as able to shape Eolithic flints, must, in the cases observed by me, be considered as non-proven.

The difficulty of the whole question consists in this, that we are trying to decide where no final decision seems possible. For those who hold that certain flints are due to natural causes have never seen, or can see, Nature doing what they would refer to Nature, and those who uphold the human origin of the flints could never, of course, have seen them actually made by man. But we have actual proof that man has and does fashion certain stone tools, and therefore have good reason for asserting that man did make some of these early tools, and we also know than man improves on his early work, so that the best forms of these cannot be man's earliest efforts. The difficulty always will lie in fixing the starting-point of his 'prentice hand.

The stages in the progression from the ruder to the more perfect forms were probably these. As soon as man found that some adjunct to the hand was needed in his conflict with Nature and the beasts, sticks, bones, shells, and stones were used. Of these, only stones, for the most part, have remained.

The stones, in the first instance, would be those best adapted to his needs, and were so selected. Next it might occur to him that he might imitate those *natural* forms : hence the difficulty to distinguish between the apparently natural forms and the possible artificial ones, both having only one sharp or sharpened edge. Then he would gradually learn so to adjust the angle of incidence as to extend the chipping all over the flint, and at last to select the kind of flint that gave the best results. The process must have been a gradual one, with intermediate stages, with reverions perhaps to older and ruder forms, and the difficulty will always lie in fixing the starting-point of the undoubted artificial stage, and I do not think that the wash-mill evidence will help to do this. But it may cause those who have been too ready to accept worked flints to be more careful in the future.

[Extracted from the GEOLOGICAL MAGAZINE, Decade V, Vol. III,
No. 501, March, 1906, pp. 143—4.]

MACHINE-MADE IMPLEMENTS.

SIR,—Since this article appeared, I have been able, in company with Mr. C. Bird, F.G.S., of Rochester, to visit a chalk wash-mill at the Borstall Cement Works near that city.

I found that the machinery used was much the same as that in the brick-earth wash-mills referred to in my article of February, 1906, but I learnt this most important piece of information, not hitherto mentioned by anyone as far as I have been able to discover, viz., that during the 2 days, or 29 hours, that the mill is at work, *fresh charges of chalk are introduced*; this is of the utmost importance, as it affects materially the results obtained. I had only a very short time for my visit, but I think I got all the available information. The men told me that, as at Mantes, they removed all the visible flints, so that the remaining ones, which they do not want, are those concealed in the chalk. The harrows also, as in the Mantes mills, do not come within some inches of the bottom of the basin, and the speed would appear to be the same at Borstall as at Mantes.

From the flint refuse heap, "the heap of Eoliths" as M. Boule styles them, I got a very good selection, some of which, as the men were able to tell me, had been in *for the full time*, and some of which had been in *for only part of the time*.

Now from those that had been in for *only part of the time* I got some flints that, if photographed, would give very fair samples of Eoliths, though not comparable otherwise with true work, some showing bulbs of percussion and the fractures so polished that they have quite an *old* look. My own attempts at forgeries are useful, as they show me that I can produce in a short time this old polish, where the flint allows of this. So that I was quite prepared for the apparent old polish on newly fractured flints from the chalk. Some of these had still on them some of the white crust of flints fresh from the chalk.

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But those flints that had been in the *full time were quite different from, and not Eoliths at all.* These must have sunk to the bottom, *quite out of reach of the harrows*, the "quasi-human element" referred to in my article of February, and thus were the results ultimately of *water-action only*, highly charged of course with chalk mud. These come out as almost perfectly smooth spheres, and quite unlike any naturally water-worn pebbles, and what one would naturally expect to be the outcome of flints, rotated at an uniform speed in a circular basin, and under conditions that do not occur in nature, save perhaps in a 'giant-cauldron.'

Those flints that go in last, especially if the space beyond the reach of the harrows be fully occupied, must be more or less, during that time, in contact with the harrows, and these are the pseudo-Eoliths.

So that we have this point, I think, clearly shown, and for the first time in this machine-made implement controversy, that the pseudo-Eoliths are the result of the pseudo-human element represented by the harrows, and that the pseudo-torrent action, apart from the harrows, only produces *spheres*. I made a selection of these from the battered, buffeted, rough, and imperfect, to the smooth and almost perfect sphere.

F. J. BENNETT.

WEST MALLING.

February 14th, 1906.

VI.

LIST OF PLACE-NAMES IN IGHTHAM PARISH.

COMPILED BY BENJAMIN HARRISON.

EXPLANATION :—S.B. = Name given in the Survey of the Bounds of Ightham Parish, May 20th, 1763, and June 3rd, 1771.
 R.C. = Name given in the Ightham apportionment of the Rent Charge, 1839.
 O.S. = Name given in the Ordnance Survey Map, 1869.
 P.N. = Present Name.
 E. = Extinct Name.

NAME.	NOTES.
Aldham	.
Baldwin Hill	.
Balk Shaw	.
Ball Court	.
Banky Field	.
Barn Field	.
Basted Lane	.
Bates' Well	.
Batt's Wood	.
Bay Shaw	.
Beacon Hill	.
Beards	.
Bearfield	.
Beech Field	.
Beechwood Field	.
Belmont	.
Bewley	.
Bewley Farm	.
The Birches	.
Bircham	.
Birches Wood	.
Bird's Hill	.
Borough Green	.
	Old name of St. Clere, <i>q.v.</i>
	R.C.
	R.C. Warren Estate.
	O.S. Near St. Clere.
	S.B.
	S.B., R.C. Warren Estate.
	P.N. Barstead Lane, old name.
	P.N. So called after an inhabitant.
	O.S. So called after a tenant.
	Near Ightham Village.
	P.N. Raspit Hill, O.S. (<i>see</i> "The Ightham Beacon").
	E. date 1657, at Ivy Hatch.
	Barefield, R.C. Oldbury.
	R.C.
	R.C.
	O.S.
	(<i>see</i> "Norman & Plantagenet Periods").
	O.S.
	R.C.
	S.B., R.C. Warren Estate.
	O.S.
	R.C. Warren Estate.
	O.S. (<i>see</i> "Anglo-Saxon Period").

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NAME.	NOTES.
Borough Green Farm	
Boses .	R.C. Ivy Hatch.
Bower House .	O.S.
Brakey Mead .	R.C. Court Lodge Estate.
Bread Seers .	S.B., R.C. Warren Estate.
Brooms .	
Buckwell .	P.N. Near St. Clere.
Bud's Lane .	S.B.
Buster, Busty .	P.N. Local names of the Shode.
Butts Field .	R.C. Butt Field. Court Lodge Estate.
Chalklins .	R.C. Warren Estate.
Charlton .	E. On Stanley's Land.
"The Chequers" .	Public House, Ightham Village.
Chilman's Great Chart Lands	S.B.
Chilman's Hop Garden	S.B.
Church Field .	R.C. Court Lodge Estate.
Cinder Field .	S.B. Mote Estate.
Cinder Field Shaw .	S.B. "
Cinder Hill Shaw .	R.C. "
Clay-pit Field .	R.C. Near St. Clere.
"The Cob Tree" .	P.N. Public House. Between Ightham and Oldbury
Cocklebridge Field .	R.C. Court Lodge Estate.
Cold Banks .	S.B., R.C. Ivy Hatch.
Coleman's Bank .	R.C. St. Clere Estate.
Collins' Mead .	S.B.
Common Field .	R.C. Ivy Hatch.
Cophall Field .	R.C. St. Clere Estate.
Court Lodge .	Ightham Court.
Cream Crox .	R.C. St. Clere Estate.
Cricket's Farm .	O.S.
Cricket's Land .	S.B.
Crown Point .	S.B., R.C. South-west of Oldbury Hill.
"Crown Point" .	Public House.
Cuckold Corner .	R.C.
Cunney Field .	R.C. (<i>see "Anglo-Saxon Period"</i>).
Dark Hill .	P.N. On the main road from Ightham to Boro' Green.
Dichers, Ditchers .	E. date 1657 at Ivy Hatch.
Dicky May's Field .	Cricket's Farm.
Dinas Dean .	S.B. The Mote Gorge.
Doles .	R.C. Warren Estate.
Doles' Cottage .	O.S.
Double Dance .	R.C. Oldbury Estate.
Drain Farm .	R.C. St. Clere Estate.
Durlin's Orchard .	S.B.
Exedown .	Due north of Ightham Church.

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NAME.	NOTES.
Fairlawn Field .	S.B.
Fane Hill .	P.N. Near Oldbury.
Fen Meadow .	R.C. Phen Field, S.B. Court Lodge Estate.
Fen Pond .	P.N. Hamlet. Phen pond, S.B. The pond itself is in Wrotham parish. Ffen, date 1313.
ffirmingers .	E. date 1657, at Ivy Hatch; also ffurmingers barne; ffrunnichers.
The Fish Ponds .	P.N. five ponds, O.S. Now nearly dry. Near Crown Point.
Ford's Field .	R.C. St. Clere Estate.
Frank-field .	(see "British and Roman Periods").
Fury Field .	R.C. Court Lodge Estate.
Gallows Field .	R.C. Gibbet Field. Oldbury Estate.
Gardiner's Lane .	R.C. Gardiner Property.
"George and Dragon"	Public House, Ightham Village.
Georges, Georgies .	E. date 1657, at Ivy Hatch.
Great Brooms .	S.B. Great Broom, R.C. Court Lodge Estate.
Greate Castles .	E. date 1657, at Ivy Hatch.
Great Cinder Field .	S.B. R.C., Mote Estate.
Great Hope .	R.C. St. Clere.
Great Lady Lands .	S.B.
Great Pitham .	R.C. Petham, P.N. Cobb, late Rector's Lands.
Grove Mead .	R.C. Court Lodge Estate.
Hawley's Field .	S.B.
Hatton .	E. On Stanley's Land.
Herley's Field .	R.C. Court Lodge Estate.
Herring Shaw .	R.C. Heron Shaw. Court Lodge Estate.
High Cross .	S.B., R.C., O.S. East of Ivy Hatch.
High Field .	E. date 1657. At Ivy Hatch.
Hiles .	S.B. Isles, P.N. The gorge slope by Basted Lane.
Hither Martin's Spring Field	R.C. St. Clere Estate.
Home Field .	R.C. Court Lodge Estate.
House of Robert le Berker	E. date 1313.
Ightham .	(see "Anglo-Saxon Period" and "Ightham Manor").
Ightham Chart .	P.N. Ightham Chate, on 17th century map.
Ightham Common .	(see "British and Roman Periods," and "Norman and Plantag. Periods")
Ightham Green .	Opposite "George and Dragon."
Ightham Knoll .	P.N. Near Ightham Common and Oldbury.

The Story of Ightham.

NAME.	NOTES.
Ightham Park	(see " Norman and Plantagenet Periods," and " St. Clere Manor ").
Ightham Street	The Street; colloquial.
Ives Field	Near Oldbury.
Ivy Cottage	O.S.
Ivy Hatch	(see " Anglo-Saxon Period ").
Ivy Hatch Plain	R.C., O.S. Base of Raspit Hill.
Kiln Field	S.B. Oldbury slopes.
Kiln Field Shaw	S.B.
King	Name used in connection with Cunney field or neighbourhood (see " Anglo-Saxon Period.")
Lady Lands	R.C. Mote Estate.
Lady Mead	S.B., R.C. St. Clere Estate.
Lady's Walk	O.S. Leading to Raspit Hill.
Lady's Wood	S.B.
Lillies Mead	S.B.
Lillies Meadow	S.B.
Little Castles	E. date 1657, at Ivy Hatch.
Little Lady Lands	S.B.
Long Hunts	R.C. St. Clere Estate (Ightham Park?)
Long Lands	S.B., R.C. Court Lodge Estate.
Long Meadow	S.B.
Longstead Lane	R.C., P.N. Ightham to Common, in Court Baron Documents, Long-street.
Lower Robsacks	R.C. at Town House.
Lower St. Clere	O.S.
Maens or Mains Field	Near Tebbs Farm.
Maple Bourne	S.B.
Marfeild	E. date 1657, at Ivy Hatch.
Martin's Wood	O.S.
Miller's Mead	S.B.
Mitten's Miller	Near Court Lodge.
The Moors	R.C. Ivy Hatch.
More	E. date 1293.
Mote	(see " Anglo-Saxon Period," and " The Mote.")
The Mote House	O.S.
Mote Stream	
The Mount	O.S. Near Ivy Hatch.
Mount Pleasant	P.N. Oldbury, east promontory.
Newgate Lane	S.B.
Newland Bottome	E. date 1657, at Ivy Hatch.
Obram Wood	R.C., O.S. St. Clere Estate.
Old Bennets' Well	P.N. Near Ightham Common.
Oldbury	P.N. Hamlet (see " Anglo-Saxon Period.")

Appendix VI.

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NAME.	NOTES.
Oldbury Hill .	O.S.
Oldbury Place .	O.S.
The Old Hop-garden .	E. date 1657, at Ivy Hatch.
"The Old House at Home "	Public House. Near Redwell.
The Old Spring .	R.C. Cobb, late Rector's lands.
Osier Bed .	R.C. St. Clere Estate.
Overham Wood .	S.B.
Oxpasture .	S.B., R.C. St. Clere Estate.
Panley's High Field .	S.B.
Park Hall Field .	R.C. St. Clere Estate.
Patch Grove .	S.B.
Pickering's Croft .	S.B. Pickenden's Croft, R.C. Mote Estate.
The Pilgrim's Road or Way .	(see "Old Roads.")
"The Plough" .	O.S., P.N. Public House, Ivy Hatch.
Pole's Bank .	R.C. St. Clere Estate.
Post Field .	R.C. Court Lodge Estate.
The Pound .	O.S. at Oldbury.
Preston's .	O.S.
Prior Meads .	S.B.
Pump House .	P.N. Near Ivy Hatch. Water supply.
Quarry Field .	S.B.
"The Railway Bell" .	P.N. Public House, formerly "Daedalus Arms."
Ranter's Hall, or Rat's Castle .	P.N. at the "Cob Tree."
Raspit Hill .	O.S., P.N. Also called Beacon Hill (see "Old Roads.")
The Rectory .	.
Rectory Lane .	.
"The Red Lion" .	P.N. Public House. (see "Old Roads.")
The Redway .	R.C., P.N. (see "Anglo-Saxon Period.")
Red Well .	S.B.
Ridge Field .	R.C. St. Clere Estate.
Ridgey Mead .	P.N. (see "Old Roads.")
The Roman Trench .	P.N. Near St. Clere.
Romney's Wood .	R.C., O.S., P.N. Warren Estate.
Rose Wood .	Oldbury (see "Brit. and Rom. Periods.")
Round-about Field .	S.B.
Ruffats .	R.C. Mote Estate.
Ruffet's Mead .	R.C. St. Clere Estate.
Rushy Mead .	E. date 1657, at Ivy Hatch.
Sandfeild .	E. date 1657, at Ivy Hatch.
Sandfeild Wood .	R.C. Scathes Wood, O.S. Mote Estate.
Scats Wood .	P.N. Local Kentish, <i>went</i> , a road or way.
Seven Wents .	R.C., P.N. Court Lodge Estate. <i>Shode</i> well.
Shadwell .	

The Story of Ightham.

NAME.	NOTES.
Shadwell Field	. P.N.
The Shode	. P.N. The Shete, date 1645; the Shod, date 1659.
Shot's House	. S.B.
Shoulder of Mutton Field	. R.C.
Spencer's Field	. S.B.
Spencer's House	. S.B.
Spindle Shaw	. R.C. St Clere Estate.
Stangate	. R.C. Borough Green Farm (<i>see "Old Roads."</i>)
Stangate Meadow	. S.B.
St. Clere	. (<i>see "Anglo-Saxon Period," and "St. Clere Manor."</i>)
Spread Eagle Inn	. E. Court Roll.
St. Peter's Church	. P.N.
Styant's Bottom	. R.C., O.S., P.N. Court Lodge Estate.
Styant's Land	. S.B.
Styant's Mead	. S.B.
Swan Pond Field	. R.C. Near St. Clere.
Swing-gate Field	. S.B.
Tebbs Farm	. O.S.
Thonglane	. R.C. Borough Green to Basted.
Thong Mead	. R.C. Court Lodge Estate.
Toll	. S.B., P.N. Adjoining Moated Mounds, Court Lodge Estate (<i>see "British and Roman Periods"</i>).
The Toll	. P.N. At Styant's Bottom.
Tollow Field	.
Town House	. P.N. (<i>see "Town House"</i>) Thrupp's Tenement?
Trice Well	. R.C., P.N. Near Ightham Post Office.
Upper Robsacks	. R.C. At Town House.
Warren	. S.B., P.N. Called Ightham Park for a few years, now Ightham Warren.
Water-flash Pond	. P.N. On Oldbury Hill.
Web's Mead	. S.B.
Welch's Orchard	. S.B.
Well Field	. R.C. Mote Estate.
Wilderness (part of)	. S.B., R.C., O.S. St. Clere Estate.
Wilderness	. S.B., O.S. Court Lodge Estate.
Wilmot Hill	. S.B. Ivy Hatch.
Windmill Hill	. R.C. Warren Estate.
Wise Field	. S.B. Vyses Field, P.N.
Woodfield Shaw	. S.B.
Wright's Farm	. O.S. Mote Estate.

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COMPILED BY

H. J. OSBORNE WHITE AND W. J. LEWIS ABBOTT.

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* Prof. Maccurdy's statements (pp. 426, 462, 465, 469) that the term "Eolithic" was first used (1) by the late Mr. J. Allen Brown, and (2) so recently as 1892, are incorrect. An "Eolithic period," anterior to the Palæolithic, is recognised in the tabular "Classification of Post-Tertiary Times, by G. de Mortillet (*Métaux pour l'Histoire . . . de l'Homme* se série, vol. [xi, tome] vii, [1876] p. 545)," given on p. 28 of Prof. T. Rupert Jones' "Lecture on the Antiquity of Man; illustrated by the Contents of Caves and Relics of the Cave-folk" (London: J. van Voorst), which was published in 1877.

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Mr. Bird informed me, some time ago, that a reference to this subject in his book, the exact terms of which I have not been able to verify before going to press, met with opposition when the book was reviewed.

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He remarks on the subsidence of the roofs of Caverns giving origin to trenches of drainage.

1906. GOSSELET, J. Extrait des Annales de la Société Géologique du Nord (France). T. xxxv, p. 237. Mai 1906.

Observations sur les creuses de l'Artois et de la Picardie, et Réflexions sur l'importance de la dissolution souterraine de la craie.

These "creuses," a phenomenon apparently peculiar to the area in question, answer fairly well to one type of my "Swallow Holes" in the Loose and Len Valleys, never noticed before. M. Gosselet says that after much hesitation he attributes them, as I do the latter, to subsidence due to combined surface and underground erosion. See note on his paper at page 131.

F. J. B.

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—THOMAS FULLER.

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